

**THE EFFECT OF PHOTOPERIOD AND FEEDING TIME ON BROILER
BREEDER EGGSHELL QUALITY AND OVIPOSITION TIME**

DEAN BACKHOUSE

BSc. Agric., University of Natal, Pietermaritzburg

Submitted in partial fulfilment
of the requirements for the Degree of

MASTER OF SCIENCE IN AGRICULTURE

in the Discipline of Animal and Poultry Science
School of Agricultural Sciences and Agribusiness
Faculty of Science and Agriculture
University of KwaZulu-Natal
Pietermaritzburg

2004

ABSTRACT

This study was conducted to determine the effect of photoperiod and feeding time on oviposition time and eggshell quality of broiler breeders. Five experiments were conducted in total.

The effect of photoperiod on oviposition time was tested in Experiments 1 and 2. Experiment 1 involved 3200 33-week old broiler breeder hens housed in floor pens and subjected to photoperiods of 10, 11, 12, 13, 14 or 16 h. Experiment 2 used 120 37-week old broiler breeders, housed in individual cages in each of two light-proof rooms; one room on 8-h and the other on 16-h photoperiods. Birds in Experiment 1 were also used to determine the effect of photoperiod on eggshell quality, although they were 52 weeks of age when shell quality was assessed.

The effect of feeding time on the aforementioned parameters was tested in three experiments. Experiment 3 involved 432 24-week old broiler breeders housed in individual cages and subjected to a 14-h photoperiod from 07.00 to 21.00. The birds were fed at 07.30, 09.30, 11.30, 13.30 or 15.30. In one further treatment, birds were fed half the daily feed allocation at 07.30 and half at 15.30. Experiment 4 made use of 800 57-week old broiler breeder females housed on litter floor pens and subjected to a 14-h photoperiod from 05.00 to 19.00. The birds were fed at 07.30, 10.00, 13.00 or 15.30. In Experiment 5, 240 35-week old broiler breeder females were subjected to a 16-h photoperiod from 07.00 to 23.00. The feeding times tested in Experiment 5 were 07.30, 10.00, 13.00 and 15.30.

Mean oviposition time was delayed relative to dawn by approximately 0.5 h for each 1-h increase in photoperiod up to 14 h, but was similar for 14 and 16-h photoperiods. The time when half a day's eggs were laid was also delayed relative to dawn by approximately 0.5 h for each 1-h increase in photoperiod, although this trend continued through to 16 h. The rate of change in mean oviposition time for each 1-h increase in ≤ 14 -h photoperiod was similar to that reported for early and modern egg-type hybrids,

but, compared with modern genotypes, time of lay itself was 1 h later than white-egg and 2.5 h later than brown-egg hybrids. At photoperiods ≤ 12.25 h, the number of eggs laid before dawn increased by 4.5% for each 1-h reduction in daylength.

Egg weight increased by 0.31 g, shell weight decreased by 30 mg, and shell thickness index decreased by 0.57 mg/cm² for each 1-h increase in photoperiod. Changes in egg weight and eggshell thickness index might be overstated because eggs were collected at the same chronological time. In spite of this, the effect of time of egg-laying within the day was minimal in comparison, and did not negate the conclusion that egg weight increases, and shell weight and thickness index decrease with lengthening photoperiods. The effect of photoperiod on eggshell quality was not due to differences in the rate of lay between treatments. Shell weight was unaffected by time of lay.

Mean eggshell thickness was increased significantly by 3.5 μm (approximately 1 %) per hour delay in feeding time when hens were housed in individual cages. However, eggshell thickness was not significantly affected by feeding time when birds were housed on litter floors. Mean oviposition time was delayed relative to lights-on by 5 min per hour delay in feeding time. Egg weight was not significantly affected by feeding time, suggesting that differences in shell thickness and oviposition times were not due to increased transit times through the oviduct.

Data presented in this thesis suggest that the current commercial practice of subjecting broiler breeder flocks to photoperiods that are in excess of the photoperiod required for maximum egg production is questionable. Apart from being unnecessary and costly, providing broiler breeders with excessively long photoperiods may be a cause of depressed eggshell thickness with consequential low hatchability. Eggshell quality can be improved by delaying the time of feeding, although improvements may only be marginal in broiler breeder flocks that are housed on litter floors. However, delaying the time of feeding may cause a delay in oviposition times. Producers who wish to implement delayed feeding should thus consider the management implications of eggs being laid later in the day.