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# EFFECTS OF TURNING FREQUENCY OF HEN'S EGGS IN ELECTRIC TABLE TYPE INCUBATOR ON WEIGHT LOSS, HATCHABILITY AND MORTALITY

**S. S. ABIOLA**

**Department of Animal Production & Health**
**University of Agriculture**
**P. M. B. 2240, Abeokuta**
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## ABSTRACT

Effects of manual turning on egg weight loss, hatchability and embryonic mortality were investigated in electric table-type incubator for six weeks. A range of 10.88 - 12.87% egg weight loss was recorded during incubation with the highest value of 12.87% obtained in the control experiment. Chick weight was influenced by the egg weight when eggs were turned once a day. Results obtained on hatchability were statistically significant ($P<0.05$) from one another. Turning eggs once a day produced the highest hatchability of 75% and lowest mortality of 25%. Mortality in the control experiment was attributed to dead-in-germs ( i.e. early embryonic mortality). Hygienic turning of eggs once a day during incubation is suitable for table -type incubator to ensure minimal egg weight loss and improved hatchability.

## INTRODUCTION

Modern incubators are usually equipped with automatic turning devices in other to improve hatchability of fertilie eggs. Eggs in such incubators are usually turned once in an hour. Deeming (1989a) indicated that egg turning facilitated the transfer of yolk nutrients to the embryo via the subembryonic fluid. The influence of egg turning on hatchability (Robertson, 1961) and its effects upon the formation of subembryonic fluid, albumen weight and composition (Babiker and Baggott, 1992) have also been reported.

Domestic fowls turn their eggs several times daily during the period of incubation. However, table-type-incubators are not provided with automatic devices for egg turning. Turning can only be done manually in such incubators. The

use of table-type incubators should be accorded greater attention particularly for hatching of either very small or big hatchable eggs which are usually difficult to set in the egg setter type of modern incubators.

This study was designed to determine the effects of manual egg turning on egg weight loss, hatchability and mortality in electric table-type-incubator. The study also recommends the required turning frequency for chicken eggs in such incubator.

## MATERIALS AND METHODS

Twenty -five (25) Yaafa egg-type layers obtained from a commercial hatchery in Abeokuta, Ogun State, Nigeria were fed breeder ration from the age of 20 weeks. Calculated composition of the breeder ration is presented in Table 1. At the beginning of the second month in lay, sixty hatchable medium sized eggs were collected from the breeders for incubation in an electric table-type incubator. The eggs were numbered, weighed individually and later arranged (twenty each) in three compartments in the JO-JO VICTORIA electric table-type incubator. The experiment was replicated twice with ten eggs per replicate. Temperature of incubator was maintained at $103^0$F while a plastic basin with water was placed centrally at the bottom of the egg tray as humidifier. The experiment which was performed twice was conducted in the Department of Animal Production and Health of the University.

On the $10^{th}$ day of incubation, eggs were tested for fertility. Infertile ones were eliminated from the incubator. Eggs in the first compartment (control) were not turned during the period of incubation while those in the second compartment were turned manually once (morning) daily. However, eggs in the third compartment were turned twice (morning and evening) daily. Eggs were turned between the $2^{nd}$ and $18^{th}$ day of incubation. Hands were covered with sterile gloves at the times of candling and turning to prevent egg contamination.

Final weight of eggs was taken on the $18^{th}$ day of incubation for the calculation of weight loss. Chicks that hatched after incubation were weighted while un-hatched eggs were opened for the determination of mortality rate. Eggs and chicks were weighed using a sensitive mettler electronic balance FJ 360 Delta Range Model. Data obtained were subjected to analysis of variance as described by Steel and Torrie (1980). Significant differences between treatment means were determined using Duncan's Multiple Range Test (Duncan, 1955).

**Table 1: Nutrient Composition of Breeder Mash.**

| Nutrients | Composition |
|---|---|
| Crude Protein (%) | 16.73 |
| Crude Fibre (%) | 3.95 |
| Fat (%) | 4.60 |
| ME (Kcal/kg) | 2,586 |
| Lysine (%) | 0.77 |
| Methionine (%) | 0.34 |
| Calcuim (%) | 3.74 |
| Phosphorus (%) | 0.47 |

## RESULTS AND DISCUSSION

Results of weight loss in the eggs during incubation are presented in Table 2. A range of 10.88 - 12.8% weight loss was obtained in this study with the highest value of 12.87% recorded for the control. This may suggest that egg in the first compartment (control) probably had more pore areas that aided greater weight loss than the eggs in the other compartments. Oguike (1995) reported that moisture loss from egg was positively correlated with pore area. The author concluded that eggs laid in the morning had smaller pore area and pore diameter than those laid in the afternoon. Ar and Rahn (1980) indicated that 15% (± 5%) of the critical egg mass was the average value for water loss for most bird eggs. Ikeme (1987) attributed losses in egg weight to outward diffusion of moisture and gases. Opening the incubator twice daily for the purpose of egg turning probably influenced the high weight loss recorded in this study.

Results of chick weight, hatchability and mortality are presented in Table 3. Chicks that hatched in the second compartment produced the heaviest body weight with average value of 36.70g while the lightest body weight of 36.62g was recorded for the chicks hatched in the first compartments. The result obtained in the second compartment is indicative of a positive correlation between chick and egg weight. This finding conforms with the report of Burke (1992) who observed that chick weight was strongly influenced by the egg weight from where the chick hatched.

**Table 2: Effect of turning frequency on egg weight**

| Parameters | Frequency of egg turning/day | | |
|---|---|---|---|
| | 0 | 1 | 2 |
| Initial egg weight (g) | 49.83± 0.99 | 52.16 ± 0.42 | 48.81 ± 0.12 |
| Final egg weight (g) | 43.41 ± 1.09 | 45.61 ± 0.85 | 43.50 ± 0.60 |
| Weight loss (g) | 6.41 ± 0.16[a] | 6.55 ± 0.50[a] | 5.31 ± 0.68[b] |
| Weight loss (%) | 12.87 ± 0.15 | 12.56 ± 0.43 | 10.88 ± 0.62 |

*a, b, = means in the same row with different superscripts are significantly (P<0.05) different from each other.*

**Table 3: Effect of turning frequency on hatchability and mortality.**

| Parameters | Frequency of egg turning/day | | |
|---|---|---|---|
| | 0 | 1 | 2 |
| Initial egg weight (g) | 49.82 ± 0.99 | 52.16 ± 0.42 | 48.81 ± 0.12 |
| Chick Weight (g) | 36.62 ± 0.25 | 36.70 ± 0.47 | 36.68 ± 0.00 |
| Hatchability (%) | 40.00 ± 0.12[c] | 75.00 ± 0.33[a] | 66.67 ± 0.30[b] |
| Mortality %) | | | |
| Dead-in-germs | 60.00 ± 0.03 | 7.00 ± 0.08 | 6.33 ± 0.05 |
| Dead-in-shell (%) | - | 18.00 ± 0.11 | 27.00 ± 0.18 |

*a,b,c = means in the same row with different superscripts are significantly (P<0.05) different from each other.*

Several other factors are known to affect chick weight. Hager and Beane (1983) indicated that early-hatching chicks loose weight (10-12%) when held in hatcher for prolonged periods. The influence of sex on chick weight has also been documented (Zawalsky, 1962). However, Dunnington, et. al. (1993) did not observe any consistent differences between the sexes and body weight at hatching.

Results obtained on hatchability were statistically significant (P<0.05) from one another. The highest hatchability of 75% was recorded in the second compartment while the lowest value of 40% was obtained in compartment one. Turning of eggs once a day probably allowed the developing embryos to settle down in compartment two. Robertson (1961) in a similar study concluded that frequency of turning had significant effect upon the incidence of malpositioning. Deeming (1995) on the other hand reported the assumption that malpositioned embryos are related to the position of the egg during incubation.

The highest mortality of 60% was recorded in the first compartment where embryos died in the early stage of incubation. This could be attributed to the failure to turn the eggs in that compartment. Deeming (1989b) concluded that failing to turn eggs retards the utilisation of albumen during late incubation. The highest weight loss earlier reported from the eggs in the first compartment could also be responsible for the highest mortality rate recorded in that compartment. Embryonic mortality is related to percentage water loss from the shell (Deeming, 1955).

In compartment two where eggs were turned once daily, lowest mortality rate of 7% Dead-in-germs and 18% Dead-in-shell was recorded. This could be due to the fact that eggs in compartment two were exposed to minimal contamination as a result of manual turning once daily. Bruce and Johnson (1978) confirmed the bacterial contamination of unhatched chicken eggs as one of the causes of mortality during incubation.

To ensure minimal water loss and improved hatchability, table-type-incubator should not be opened frequently for the purpose of egg turning. Eggs should be turned hygienically once a day between the 2nd and 18th day of incubation in such incubator.

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