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EFFECT OF EGG WEIGHT ON PRE-HATCH PERFORMANCE IN BROILER CHICKENS

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Abstract: A study was conducted to determine the effect of egg weight on hatchability and chick weight in CARIBRO Vishal broiler chicken. In the present study a total of 600 eggs were selected and allocated into three treatments 200 each: small (<49g), medium (50-59g), and large (60-69g) and incubated at stranded incubation temperature and humidity. The result showed that hatchability percentage of large sized egg was significantly higher ($P<0.05$) in compare to medium and small sized eggs, however higher embryonic mortality were recorded in small egg size groups. Percent moisture loss were significantly ($P<0.05$) higher in small sized egg group. Higher chick weight and lower embryonic mortality was observed in large sized egg group in compared to medium and small sized group.
Keywords: Egg weight, hatchability, chick weight, moisture loss.

Introduction

Poultry production is the main source of household nutrition and income in the developing countries. In poultry reduce the marketing age year by year to generate more profit but the period of embryonic development is remained fixed that required 21 day of incubation period. The greater percentage of life of chicken that spent in incubator where embryonic growth occurs that may be effect by egg weight. During the incubation, loss of egg weight occurs because of evaporation of water from shell (Tona *et al*, 2001). Deeming (1995) determined that 10–12% weight loss is necessary during incubation in order to get a good incubation result in stored and non-stored eggs. In the production cycle of the commercial layer, the hen will begin to lay small eggs and in a matter of few weeks will go to medium size and then to the desired large size egg. Although egg size can be manipulated using fat levels, protein and enzymes, some other factors such as age and body weight of the hen, yolk weight and nutrient intake can influence egg size. The performance of the chicken in terms of hatchability and chick hatch weight may be closely related to weight of the egg (Rashid *et al*, 2005; King'ori *et al*, 2007). King'ori (2011) suggested that chick weight, fertility and

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hatchability are interrelated heritable traits that vary among breeds, variety or individuals in a breed; it therefore becomes very important to understand the effect of egg size on these traits in CARI-BRO Vishal broiler chickens.

The objective of this study was to examine the effects of egg size (small, medium and large) on hatching egg weight loss, hatchability traits, embryonic mortality and chick weight in a CARI-BRO Vishal broiler breeder flock.

Materials and Methods

A total of six hundred hatching eggs of (CARI-BRO Vishal) broiler chicken were procured from Experimental Broiler Farm, CARI, Izatnagar and divided into three groups on the basis of egg weight, small (<49g), medium (50-59g), and large (60-69g), each group contain 200 eggs, were individually weighed before incubation to determine initial egg weight, numbered and fumigated with formaldehyde before being set into an incubator set at 37.5°C with 60% relative humidity. Eggs were re-weighed at 18 days of incubation to determine Percent moisture loss after those eggs were transferred into hatcher to allow for hatching at 37.5°C and 70% relative humidity. After hatching chicks were weighed and unhatched eggs were opened to determine infertility and the number of dead embryos.

Statistical analysis

All data were determined by using the SPSS version 20, statistical analysis programme. A p value of <0.05 was considered for significant differences among groups, and the comparison of means was made by using Duncan's Multiple Range test.

Results and discussion

Results of the effect of egg weight on hatchability and chick hatch-weight of broiler chicken are presented in Table .1. The egg weight were significant effect (P<0.05) on hatchability, moisture loss, embryonic mortality and chick weight. The hatchability percentage of large and medium sized egg group were respectively.

Table 1: Effect of egg weight (g) on hatchability, moisture loss, embryonic mortality and chick weight of CARI-RRO Vishal chicken.

S.N.	**Parameters**	**Small**	**Medium**	**Large**	**P Value**
1	Moisture loss (%)	$13.09^{a} \pm 0.12$	$8.34^{c} \pm 0.29$	$10^{b} \pm 0.31$	0.021
2	Hatchability (%)	$66.0^{c} \pm 2.81$	$74.4^{b} \pm 2.83$	$80.2^{a} \pm 1.32$	0.045
3	Chick weight (g)	$34.73^{c} \pm 0.26$	$41.86^{b} \pm 0.28$	$45.24^{a} \pm 0.34$	0.033
4	Embryonic mortality (%)	$15.3^{a} \pm 2.54$	$10.56^{b} \pm 2.21$	$6.13^{c} \pm 2.15$	0.039

[abc]Mean values bearing different superscripts within rows differ significantly (P<0.05)

The percent hatchability of large sized eggs (80.2 ± 1.32) were higher than those in medium (74.4 ± 2.83) and small egg sized (66.0 ± 2.81) group. The finding of present studies were similar to the finding of DeWitt and Schwalbach (2004) who observed that higher hatchability percentage on large size eggs in New Hampshire and Red Rhode Island chicken breeds. Ng'ambi *et al* (2013) also found similar observation in venda chicken however, contrary of our result Abiola *et al* (2008) who observed that higher hatchability in medium size eggs of Anak broiler chicken. Farooq *et al* (2001) also found negative correlation between egg weight and hatchability in cross breed chickens. The reason for the differences in hatchability in all above studies might be due to age and breed differences. The moisture loss from eggs up to the 18 days of incubation were 13.09±0.12, 8.34±0.29, and 10 ± 0.31, in small, medium and large sized egg groups respectively. Higher moisture loss was observed in small sized eggs group compared to higher and medium sized egg groups, it might be due to small eggs have a higher surface to volume ratio so higher amount of water loss from small sized eggs during incubation. These finding were similar with finding of Ulmer-Franco *et al* (2010) who reported that higher egg weight loss from small sized eggs in cobb broiler breeder hen. Contrary to the current findings, Hassan *et al* (2005) reported that higher egg weight loss occurred in large eggs compared to smaller and medium sized eggs. The differences in egg weight losses among different studies during incubation can be due to the difference in breed and species of poultry. Embryonic mortality in small, medium and large sized egg group was, 15.3 ± 2.54, 10.56 ± 2.21 and 6.13 ± 2.15 respectively. Higher embryonic mortality was recorded in small size group in compared to higher and medium sized egg group, it may be in small eggs there may be insufficient nutrients and pores, which could affect the embryo development and the hatching process (Mcloughlin & Gous 1999). The result of present study were also similar to the finding of Tona *et al* (2001) which revealed that higher embryonic mortality was observed in small size egg in cob strain of chicken. In contrast of present studies, Abiola *et al* (2008) reported that lower embryonic mortality in medium-sized eggs of Anak broiler. Chick weight from small, medium and large egg sized group was1, 2, and 3 respectively. The effects of egg weight on chick weight were significantly higher in heavier egg sized group. Our result were agreement with finding of Vieira *et al* (2004) who found more chick weight in large size egg in compare to small one in 40 weeks old Ross-38 breeders. Ng'ambi *et al* (2013) also found similar observation that egg weight was positively correlated with chick hatch-weight in venda chicken. The increase in

chick weight due to increasing egg weight due to heavier egg contains more nutrient than small egg (Willams, 1994).

Conclusion

From the above finding, hatchability, moisture loss, chick weight and embryonic mortality were influenced by egg weight in CARI-BRO vishal broiler chicken and based on our result it is can be recommended that larger eggs of CARI-BRO vishal broiler chicken can be suitable for better hatchability percentages, higher chick weight and lower embryonic deaths.

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