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EFFECT OF EGG SIZE ON CHICK HATCH WEIGHT AND SUBSEQUENT BODY WEIGHTS OF TWO STRAINS OF RHODE ISLAND CHICKS UNDER SELECTION

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Target Audience: Hatchery Operators, Poultry Producers and Poultry Research Scientists /Teachers.

ABSTRACT

An experiment was conducted to investigate the effect of egg size on chick hatch weight and the subsequent weights of chicks up to 12 weeks of age in Rhode Island Red and White strains of Chickens. The mean egg size were 50, 54.4 and 59.6 g for small, medium and large eggs, respectively for the red strain, and were 51.7, 57.5 and 63.7g, respectively, for the white strain. The weight of the chicks as a percentage of egg weight was not significantly influenced by the group they were hatched from. However body weight up to 12 to 12 weeks of age differed significantly when eggs were classified into small, medium and large size. Though the body weight of chicks from medium and large size eggs were not significantly (P>0.05) different after the first week of life in either strain.

Key words: Egg size, Growth, Hatch weight, Body weight, Layers

DESCRIPTION OF PROBLEMS

The effect of the size of hatching eggs on the chicks' weights at day old and at subsequent ages is well documented for chicks bred in temperate regions (1, 2) where egg size has been found to influence chick weight at hatching. The hatching weight of chicks is approximately 65% of egg weight (3). There are reports that egg weight is positively correlated with subsequent growth in the domestic fowls (4, 5). Similarly, in studies with broilers, it was reported that the weight of day old chicks influenced their subsequent liveweight (6), although as the birds increased in age, the effects of egg weight diminishes for turkeys and guinea fowl (7,8). In layers, it was indicated that a 10 % difference in hatched egg size resulted in 3-5%difference in the body weight at 18 weeks old (9). Similarly, there is a decrease of 4 to 5% at 16 weeks for pullets hatched from small eggs compared to those from large eggs (2, 9). However, there is dearth of information on the effect of egg size on the hatching weight and subsequent growth of chicks bred in the tropics. The present study was therefore initiated to provide such information.

MATERIALS AND METHODS

Egg collection, Hatching and Brooding

Fertile eggs collected daily for a period of seven days from two strains (red and white) of Rhode Island breeder chickens were individually labeled and weighed on the day of collection using a Mettler P.160 electronic balance. All the eggs were set in a Western Incubator and were candled on the 19th day of incubation so as to remove those which were infertile. Subsequently, they were transferred into a hatcher using hatching trays partitioned into nine individual compartments for pedigree hatching. All hatched chicks were individually weighed and wing banded before they were moved to the brooding house. The chicks were brooded for eight weeks, after which they were transferred to the rearing house.

The chicks were weighed weekly for the first 6 weeks and fortnightly thereafter. The diet fed between 0 and 6 weeks of age contained 19% crude protein, 2850kcal/kg ME, 4.8% fat, 6.3% ash, 1.2% Ca and 0.62% P, while that fed from 6 to 12 weeks of age contained 15% crude protein, 1750kcal/kg ME, 4% fat, 8% crude fibre, 0.8% Ca and 0.62% P.

Statistical Analysis

Eggs were grouped into three classes namely small, medium and large based on their weight. Means and standard errors were computed for each of the response variables (egg weight and chick weights at various ages up to 12 weeks of age) for the three groups. Simple one way analysis of variance was performed on each of the response variables, and significant means were separated using Tukey HSD multiple comparisons. The data were also subjected to correlation analysis (10).

RESULTS AND DISCUSSION

The effect of egg size on the hatching weights of chicks indicate that egg size had a positive effect on the body weight of day-old chicks as indicated in Table 1. In Table 2, the effect of egg size on body weight up to 12 weeks of age is shown.

Table 1: Mean weight of hatching egg and chick weights (g) at day old

Strain	Traits	Egg Size		
		Small	Medium	Large
Red	Egg weight	50.0±0.2^a	54.4±0.1^b	59.6±0.3^c
	Chick weight	33.6±0.4^a	36.0±0.4^b	40.0±0.4^c
	Chick weight as % of egg weight	65.8±1.0	67.4±0.9	65.8±0.7
Brown	Egg weight	51.7±0.2^a	57.5±0.1^b	63.7±0.3^c
	Chick weight	34.1±0.3^a	38.7±0.2	41.9±0.4^b
	Chick weight as % of egg weight	66.5±1.1	66.2 ±0.8	68.0±0.7

Means carrying the same superscripts within a row are not significantly different (P<0.05)

The size of the egg significantly affected weight of the day-old chicks in both strain agreeing with earlier works on broilers (1, 6, 11); turkeys (7) and layers (2, 9).

Egg size was reported to have influenced shank size with chicks from smaller eggs having smaller shank length (12). The present study also confirmed previous reports that differences in chick weights at day old have a significant effect upon subsequent growth rate.

Some of the reasons why heavier chicks develop from larger eggs include more space, more nutrient than those from smaller and lighter eggs. There is an indication (4) that 14 day embryos in small eggs are smaller ($P<0.05$) than those in large eggs but this effect was not significant after only 11 days of incubation. Similar report have been given for guinea fowl(5). The role of egg size as a factor in determining the subsequent body weight of the young hatched from it has remained unresolved. However, it is probable that such differential growth relates to protein content of the eggs and that fat content has little effect (11). Large eggs was found to contain more protein on an absolute basis but did not differ from smaller eggs on proportional basis (2). They suggested that the absolute rather than the proportional quantities of protein and other nutrients may be of importance in embryo development. In wild geese, gosling from larger eggs have a higher survival rate and such eggs contain more yolk on an absolute but not on proportional basis (13).

CONCLUSION AND APPLICATION

1. It may be possible to influence the growth rate of pullet chicks by selecting for eggs for hatching on the basis of their size.

2. Chicks hatched from eggs of a limited range of weights (54-57 g) appeared to have a more predictable growth rate, and the management requirements may vary on this basis.

3. Nutritional requirements might be different for groups of pullets expected to be small or large at the point of lay, since studies have shown (16) that pullets must reach a minimum body weight and/or age before commencing egg production.

4. Small eggs should not be set as the chicks hatched from such eggs are less likely to attain the optimum body weight early enough which will in turn lead to delay in age at first egg.

Table 2. Mean Body weights (g) as affected by egg size

	White Strain			White Strain		
	Small	Medium	Large	Small	Medium	Large
Day old	34.1±0.3[a]	38.7±0.2[b]	41.9±0.4[c]	33.6± 0.6[a]	36.0±04[b]	40.5±0.4[c]
1	42.0±0.5[a]	47.9±0.5[b]	50.4±0.6[b]	36.8±1.2[a]	42.8±0.4[b]	45.4±0.8[b]
2	52.3±0.9[a]	59.5±0.8[b]	62.6±0.9[b]	43.8±1.6[a]	53.2±1.0[b]	56.6±0.9[b]
3	67.7±1.4[a]	78.1±15[b]	81.8±1.6[b]	55.9±2.3[a]	69.6±1.6[b]	71.6±1.7[b]
4	79.4±2.1[a]	93.7±2.2[b]	95.6±2.5[b]	70.1±3.4[a]	87.4±2.9[b]	91.1±2.9[b]
5	102.4±3.1[a]	125.8±3.4[b]	123.0±3.4[b]	102.0±4.1[a]	118.0±4.5[b]	123.9±4.0[b]
6	122.9±3.9[a]	143.2± 45[b]	143.5±43[b]	123 9±48[a]	149.6±5.5[b]	151.8±5.2[b]
8	192.9±6.6[a]	217.9±6.4[b]	211.9±6.2[b]	200.2±8.5[a]	237.2±9.2[b]	239.8±8.4[b]
10	251.0±8.0[a]	280.6±8.0[b]	274.8±7.5[b]	247.0±9.9[a]	292.0±11.3[b]	309.4±10.0[b]
12	344.0±16.0[a]	410.3±11.9[b]	403.7±11.8[b]	351.0±18.3[a]	438.0±17.3[b]	459.0±18.0[b]

Means carrying the same superscripts within strain within row are not significantly different (P<0.05)

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