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Pramod Sharma

Department of Animal Nutrition
College of Veterinary Science &
AH, NDVSU, Jabalpur,
Madhya Pradesh, India

Ankur Khare

Department of Animal Nutrition
College of Veterinary Science &
AH, NDVSU, Jabalpur,
Madhya Pradesh, India

VN Gautam

Krishi Vigyan Kendra,
Korea, IGKV, Raipur,
Chhattisgarh, India

Neelu Vishwakarma

Krishi Vigyan Kendra,
Mandla, JNKVV, Jabalpur,
Madhya Pradesh, India

Correspondence

Pramod Sharma

Department of Animal Nutrition
College of Veterinary Science &
AH, NDVSU, Jabalpur,
Madhya Pradesh, India

Correlation of hatching egg weight with hatchability percentage and chick weight of white leghorn breeder (BV-300 strain)

Pramod Sharma, Ankur Khare, VN Gautam and Neelu Vishwakarma

Abstract

A study was carried out to find the correlation of hatching egg weight with hatchability percentage and chick weight of White leghorn breeder (BV-300 Strain). Eggs were divided into three different size groups as small: (≤ 50 g) medium: (51-60 g) and large: (≥ 61 g) for the study. The complete randomized design (CRD) method was used for analyzing the data obtained during the study. Medium size eggs group showed higher ($P < 0.05$) hatchability percentage than other groups. However, the chick weight of large-sized eggs group was significantly higher ($P < 0.05$) than chick weight of small and medium-sized eggs. It was found that the average hen day production, feed intake per bird per day and average egg weight was 79.51%, 116.71g and 55.00 g respectively. The data concluded that medium egg size was beneficial to maximize the hatchability percentage and chick weight in White leghorn breeder (BV-300 Strain).

Keywords: Chick weight, feed intake, hatching egg weight, hatchability percentage and white leghorn breeder (BV-300 strain)

Introduction

India ranks third in egg production and fifth in chicken meat production in the world [3]. The poultry egg ensures the growth and protection of the embryo inside and its hatching into a chick [9]. Hatchability is a number of chicks hatched, and is affected by many factors especially egg weight and age of breeders, season of the year and nutrition, temperature and humidity in the incubator, handling of the hatching egg and storage. In addition, it has been observed that hatchability percentage, chick weight and growth of chicks thereafter depend mainly on the weight of the egg. Little information is available regarding the topic. Therefore, the present study was taken up to find out the effect of hatching egg weight with hatchability and chick weight of White leghorn breeder (BV-300 strain).

Methodology

A study was carried out at the Phoenix Poultry, Raipur (C.G.) India on 2250 hatching eggs which were laid by the 875 White leghorn breeder (BV-300 Strain), aged 55 weeks to find out the correlation between the hatching egg weight with hatchability and chick weight. Similar environmental and management conditions are followed to rear the experimental birds and feeding & watering was done as per the requirements [10]. The ingredient composition and chemical composition [2] of the feed presented in the Table 1 and Table 2, respectively. The collection of hatching eggs was done between 8.00 am and 11.00 am. After collection, the eggs were numbered and weighed using digital weighing balance and divided into three egg size categories as small (≤ 50 g), medium (51-60 g) and large (≥ 61 g) thus, ending up with three different incubating hatching egg size groups with three replicates per group. Each egg size group had 750 eggs with 250 eggs per replicate. Thereafter, the eggs were fumigated with formalin and KMnO_4 for 15 minutes and then set into a incubator at dry bulb temperature of 37.5°C and wet bulb temperature of 28.3°C with the broad ends up. On the Eighteenth day of incubation, candling was done and those with evidence of embryos alive were transferred from the incubator trays to hatching tray. Total eggs that hatched per replicate within each egg size group were recorded at twenty one day of incubation.

Table 1: Ingredient composition of feed

Ingredient	Percent	
	Phase I	Phase II
Maize	45.0	45.5
Soybean cake	28.0	27.4
De-oiled rice bran	7.2	7.0
Rice polish	6.0	6.0
Shell grit	7.0	7.0
Lime stone powder	2.0	2.4
Di-calcium phosphate	1.8	1.7
Salt	1.0	1.0
Mineral mixture	2.0	2.0
Total	100.0	100.0

Table 2: Chemical Composition of feed

Particular	Phase I	Phase II
Dry matter (%)	89.02	90.73
Metabolizable energy (Kcal/kg)	2532.50	2625.07
Crude protein (%)	17.50	17.52
Ether extract (%)	2.64	2.72
Crude fibre (%)	3.90	4.03
Calcium (%)	3.71	3.83
Phosphorus (%)	0.728	0.719

The hatchability percentage of the each replicate was calculated by using the following formula:

$$\text{Hatchability \%} = \frac{\text{No. of eggs hatched}}{\text{No. of eggs set for incubation}} \times 100$$

The weight of each chick was measured individually immediately after hatching. The data obtained during experiment was analyzed statistically by using Completely Randomized Design method [15].

Results and Discussion

Results for correlation between hatching egg weight on

Table 4: Production Performance of White leghorn breeder (BV-300 Strain)

Age (wk)	Hen day production (%)	Feed intake/bird/day(g)	Average egg weight(g)
19-22	44.4	62.53	49.22
23-26	76.81	93.28	50.75
27-30	90.00	119.38	51.75
31-34	89.93	119.82	53.12
35-38	84.27	119.82	53.75
39-42	87.96	114.96	54.50
43-46	84.85	118.91	55.50
47-50	84.50	120.31	56.00
51-54	82.03	136.92	56.37
55-58	81.27	119.99	56.87
59-62	80.66	139.60	57.62
63-66	79.18	130.46	58.00
67-70	76.02	122.09	58.75
71-72	62.96	115.14	60.75
Mean	79.51	116.71	55.00

From the table 4, it was found that the average Hen day production, feed intake per bird per day and average egg weight was 79.51%, 116.71g and 55.00 g, respectively. The range of egg sizes used in this study had a significant effect on hatchability and chick weight in White leghorn breeder (BV-300 Strain). Medium sized-eggs had a higher hatchability value of 86.2% than small-sized and large sized eggs. However, large-sized eggs produced chicks with higher chick weight than small and medium sized eggs.

It may be concluded that sorting of eggs by weight prior to

hatchability percentage and chick weight of White leghorn breeder (BV-300 Strain) are presented in Table 3 and production performance of White leghorn breeder (BV-300 Strain) are presented in Table 4. Results indicate that hatchability percentage ranged between 69.5 - 86.2%. Many factors which influence the hatchability percentage of poultry eggs includes storage of eggs [16], storage condition [4], age of parent bird [12, 6]; system of rearing [17], mating system [7], relative humidity of incubators and angle at which hatching eggs are turned [11]. Medium sized-eggs had a higher ($P<0.05$) hatchability of 86.2% than large (81.6%) and small (69.5%) sized eggs. This indicated that eggs belonging to the group of 51-60 g were found best for setting into the incubators. There may be chances that egg quality and storage conditions might have influence these differences as observed by Seker *et al.* (2004) [13]. These findings were also supported by the Wilson (1997) [18] and Kalita (1994) [8] in broiler chickens.

Table 3: Effect of hatching egg weight on hatchability percentage and chick weight of White leghorn breeder

Variables	Hatching egg weights		
	Small (≤ 50 g)	Medium (51-60 g)	Large (≥ 61 g)
Hatchability (%) \pm SE	69.5 \pm 0.02 ^a	86.2 \pm 0.04 ^c	81.6 \pm 0.01 ^b
Chick weight (g) \pm SE	32.7 \pm 0.01 ^a	41.1 \pm 0.04 ^b	48.4 \pm 0.02 ^c

a,b,c: Means in the same column not sharing a common superscript are significantly different ($P<0.05$)

SE: Standard error

The present study shows that, eggs belonging to large-sized group produced higher ($P<0.05$) weight chicks than others. Abiola *et al.* (2008) [1]; Shanawany (1987) [14] and Bray (1965) [5] physiologically explained that there may be positive correlation between hatching egg weight and chick weight in broiler chickens. This shows that increase in egg size would be essential for maximizing the hatchability and chick-hatch weight in White leghorn breeder (BV-300 Strain).

incubation is advantageous in obtaining higher hatchability and better chick weight in White leghorn breeder (BV-300 Strain). The study will help to produce uniform size layer (BV-300 Strain) to meet specific market demands with improved efficiency.

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