International Journal of Applied Research
Journal HP: www.intjar.com, ISSN: 2411-6610

Effect of body weight at maturity on fertility and hatchability traits of broiler parent stock

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ARTICLE INFO

Article history

Received: 20 August 2020
Accepted: 27 September 2020

Keywords

Body weight, Maturity, Fertility, Hatchability, Parent stock, Broiler

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ABSTRACT

Among the industrial sectors upon which the economic development of Bangladesh depends, poultry are the most vital and prominent one. Poultry is obviously a very important and promising sector for economic development. The sources of animal protein in Bangladesh are mainly beef, cheavon, mutton and chicken meat, among them chicken is most popular and common source of meat which can be commonly produced within shortest possible time and can effectively bridge up this nutritional gap at faster time. No such research work has been performed with the effect of body weight at maturity on fertility and hatchability traits in case of broiler parent stock in Bangladesh. The experiment was conducted for 20 weeks (22-42 weeks of age). There were three treatment and each treatments had tree replications. Each replication contained 12 hens and 2 males. The treatments were considered as over-weight, standard weight and under-weight group of matured broiler birds. For each strain similar treatment and replication were arranged. For both the strains similar number birds were managed the numbers of birds were 126 for each strain. The original source of the birds was the reputed hatcheries in the Thailand. The birds were procured from the above mention hatcheries through their respective representatives in Bangladesh. The standard body weight group performed better in relation to fertility and hatchability and also in other hatchability traits. Such body weight group should be maintaining under Bangladesh conditions to obtain good potentiality from broiler parents.

Introduction

Bangladesh is one of the densely populated country in the world. Population per square kilometer is nearly 2889, which is the height of the world (United Nations, 2019). According to the recent statistics, about 10% people are normal, and 47.0, 38.4 and 4.3% people suffering from mild, moderate and severe malnutrition respectively in Bangladesh (BBS, 1998). This situation is created mainly due to the shortage of animal protein in the diet. Where per capita requirements of meat and eggs are 120g/day and 2eggs/week (DLS, 2018), the average per capita availability is 122.10 g/day and 1.83 eggs/week (DLS, 2018). The sources of animal protein in Bangladesh are mainly beef, cheavon, mutton and chicken meat, among them chicken is most popular and common source of meat which can be commonly produced within shortest possible time and can effectively bridge up this nutritional gap at faster time.

Bangladesh provides a very fertile virgin field for the development of poultry industries. During the last decade, the poultry sector of Bangladesh has developed significantly. Poultry birds are no more only a back yard farming now, it is shaping up as a industry. The economical impact of poultry farming is encouraging new investment in this sector. But still our poultry industries are facing some constrains, which are hampering its higher possibilities of prosperity.

According to Hamid et al., (2017) there are more than 84 hatcheries in Bangladesh in 2010-11 with a total strength of approximately 3.37 million Broiler parent stock and producing approximately 320.5 million day old broiler chicks annually. From 1984 to 1992 the Broiler parent stock growth rate was very low but after 2000-01 the production picked up at a sharp rate and produced 320 MMT in the year of 2010-11. The attached statistics of parent stock in Bangladesh is furnished as reference.

Table 1: Statistics of parent stock in Bangladesh (Hamid et al., 2017)

Year	Number of broiler parent stock	Number of Day-old broiler chicks
1984-85	5,000	600,000
1991-92	30,000	3,540,000
2000-01	1,550,000	126,000,000
2003-04	1,990,000	186,264,000
2004-05	2,454,000	237,432,000
2005-06	3,225,000	301,912,000
2008-09	3,128,000	297,200,000
2010-11	3,374,000	320,500,000

Many commercial broiler farms have been established in Bangladesh and numbers of farmers

Cite this article: *Pramanik, M. A. H., Chowdhury, S. D., Roy, B. C., Khatun, M.T. & Biswas, S. (2020). Effect of body weight at maturity on fertility and hatchability traits of broiler parent stock. International Journal of Applied Research, 6 (2): 16-25. DOI: 10.5281/zenodo.4063702*

are further increasing. With the increasing set up of commercial broiler farms, the demand of day-old broiler chicks is increasing proportionately. To fulfill the growing demand, a huge number of day-old chicks should be produced. But only a few numbers of hatcheries are maintaining the parent stock and grandparent stock farm has not been established in this country. There is a need to find out the procedure and best technologies, how hatcheries can produce a large number of chicks from the limited facilities. The farm owner, who are establishing the parent stock farm, have only the vast amount of money, but required technical 'know how' are not available, which has become a matter of research.

Body weight is an important factor for egg production, egg weight, fertility and hatchability. Because the birds of heavier body weights produces fewer eggs (Robinson and Wilson, 1996; Barbour et al. 1996; Spratt and Leeson, 1987; Pearson and Herron, 1982). Kwakkel et al. (1991) treated body weight as the determinant of laying performance. Broody et al. (1980) also reported that a minimum body weight and age might be required for the onset of lay.

Berti et al. (1996) showed body weight at 18 weeks had no significant effect on the age at sexual maturity or at 50% egg production. Okpokho et al. (1987) reported that higher body weight hen produced significantly more total and settable eggs. So, relationship between the weight of broiler breeder and level of production has received considerable and well deserved attention. Today it is generally acknowledged that if breeders gain too much weight or too quickly, they control their reproductive processes (Robinson and Wilson, 1996).

Body weight also affects the egg weight. Generally, the larger birds lay eggs which are bigger in size than the smaller one. At the onset of laying, the eggs become smaller and then increase in size with the increasing age. Nys et al. (1990) concluded that, in case of dwarf broiler fowls, egg weight was highest for the heaviest fowls and similar comment was expressed by Triyuwanta et al. (1992); Summer and Leeson (1983); Leeson and Summer (1987); Wilson and Herms (1986). The comment was also supported by Bish et al. (1985) and they reported that higher body weight produced smaller eggs (Summer and Leeson, 1983).

It was also out lined that, egg size was increased with the age of the birds (Luykx, 1994; Gous et al. 2000; Robbin et al., 1988). Hurwitz and plavnik (1989) and Okpokho et al., 1987) have given importance on the age at maturity, which may influence the egg weight.

Body weight also affects the fertility and hatchability of breeders. Robinson and Wilson (1996) reported that body weight was associated with a significant reduction in the hatchable eggs. The excess of weight hinders the ability of the female to complete successful mating. Problem of relative size between male and female are common in over weight birds. It is also proven that over weight female has a diminished capacity for sperm storage, since sperm storage glands are surrounded and contracted by fat and there are also fat globules present internally. Hocking and Bernard (1997) outlined that lower fertility was associated with greater weight of breast muscle; lower frequency of observed copulation and a high number of incomplete mating. Age also is an important factor that affects fertility and ultimate hatchability of eggs. Normally the fertility of pullet eggs is more than the aged hens.

Luykx (1994) indicate that age of hens was the most important factor affecting fertility and eggs from the older hens deteriorate more quickly than younger ones. Hocking and Bernard (2000) said that there might be little difference in the fertility of male and female broiler breeders at different age. Lilburn et al. (1990) pointed out that fertility decreased significantly at 28 weeks of age but not at 31 or 35 weeks of age. Comment opposite to this was also made by Roque and Soares (1994) who outlined that fertility was not affected by breeder age. Olutunmogun et al (2018) concluded that to attain better fertility and hatchability medium eggs should be selected for broiler parent and minimum weight loss is occurred when selected large eggs. The various studies were carried out in abroad and data emerged from those works may not fully applicable under Bangladesh context.

The recent development indicates that the number of parent stock farms and parent birds are increasing day by day. Though the number of farms and birds are in increasing competitively, the management technologies and other necessary information are not available to the farmers which may affect the performance of broiler parent. The performance data particularly the effects of parent body weight on productive performance under Bangladesh

conditions are lacking. The commercial producer who are maintaining broiler parent stocks, develop their management techniques mostly on the basis of past experience and limited farmers collect data permanently. The farmers, who are generating data, keep them strictly confidential.

Many farmers claim that the birds that achieved overweight and underweight are not good producers and only the standard weight birds may give satisfactory production. So, special attention should be paid on the body weight during growing phase. Actually, no research has been carried out still now, how body weight affects the productive performance under Bangladesh context. That is why, the experiment was under taken with the following objectives:

1. To determine fertility and hatchability of eggs laid by broiler parent stock that achieved different body weight under restricted feeding.
2. To suggest correct grading of uniformity on the basis of result for fertility and hatchability traits.

Materials and methods

Statement of the problem

The research work was conducted within the facilities of the project entitled "Comparative study of the performance of different strains of poultry under Bangladesh conditions" at Bangladesh Agricultural University poultry farm. Before starting the experiment the birds were divided into three groups depending on achieved body weight at 22 weeks of age, which were previously grown from day-old. These three groups were overweight, standard weight and underweight. Here standard weight groups were considers according to the breeders information available in the breeder manual. Here birds those achieved target body weight and also within ±10% of the target body weight was considered as standard. Those weighed more than 10% and less than 10% were considered as overweight and underweight respectively. Fertility and hatchability traits and day-old chicks' weight after hatching were observed for each group separately.

House preparation

First of all, house was selected for carrying out experiments. The houses were made clean and washed with tap water top to bottom and each and every corner and then disinfected with disinfectant, phenyl and subsequently dried well. After drying small pens were prepared with wire netting having 305 cm (10 ft) length and 183 cm (6 ft) width for each. Each pen was suitable for housing 14 chickens (i.e. 12 females and 2 males). At the later stage of preparation of the houses the litter materials (Sawdust) were spread on the floor as bedding material at 4-5 cm depth for birds' comfort ability. Then birds were placed in the individual pens.

Source and type of birds

The original source of the birds was the reputed hatcheries in the Thailand. The birds were procured from the above mention hatcheries through their respective representatives in Bangladesh.

Type of birds

The experiment was carried out with broiler parent stock of two different strains and marked as the strain-1 and strin-2.

Preparation and placement of nests (egg laying box)

Low cost wood materials were used to prepare the nest. The nests were prepared in such a dimension that the hens got adequate space inside. The dimension of the nests i.e. height, width and length was 45 cm × 45 cm × 45 cm. the nests were placed at a corner of the each pen so that the birds did not feel any disturb at the time of laying.

Lay-out of the experiment

There were three treatment and each treatments had tree replications. Each replication contained 12 hens and 2 males. The treatments were considered as over-weight, standard weight and under-weight group. For each strain similar treatment and replication were arranged. For both the strains similar number birds were managed the numbers of birds were 126 for each strain.

Introduction of birds in the pen

Previously grown (day-old to 22 weeks of age) chickens were weighed and introduced in the pen according to the layout of the experiment depending on body weight. For each treatment and replication birds were considered randomly. Efforts were made to maintain uniformity for each replication on each treatment in relation to body weight.

Feeding management

Three kinds of feed were fed to the experimental birds. These diets were pre-breeder diet, Breeder diet-I and Breeder die-IIfor female birds. For male birds, breeder diet males were supplied. The feeds were procured from the Aftab Feed Mill of Aftab Bahumukhi Farm Ltd., Bhagolpur, Bajitpur, Kisorgonj. Pre-breeder, Breeder diet –I, Breeder diet-II and Breeder diet male were used depending on the production status of the broiler breeder birds following breeder's manuals.

Forms and composition of feeds

The feeds which were supplied to the experimental birds were pellets. The ingredients composition and nutrients composition of different diets used for breeder are given below.

Table 2: The nutrient composition of different diets used for breeders

Nutrients	Pre breeder diet	Breeder diet-I	Breeder diet-II	Breeder diet-male
Dry matter (%)	84.81	83.21	78.32	88.64
ME (Kcal/kg)	2850	2800	2800	2736.11
Crude protein (%)	16.81	16.50	15.65	14.60
Crude fiber (%)	3.58	3.25	3.35	4.00
Calcium (%)	1.30	3.30	3.40	0.98
Av. Phosphorus (%)	0.42	0.44	0.36	0.40
Lysine (%)	0.82	0.78	0.80	0.61
Methionine (%)	0.36	0.43	0.33	0.35
Meth + Cyst (%)	0.63	0.71	0.57	0.62
Threonine (%)	0.59	0.61	0.58	0.52
Tryptophan (%)	0.22	0.21	0.22	0.19
Choline (mg/kg)	2001.24	1963.75	1929.44	1886.45
Chlorine (%)	0.23	0.21	0.18	0.24
Sodium (%)	0.20	0.17	0.16	0.17
Linoleic acid (%)	1.71	2.82	2.70	1.62

Nutrient concentrations were in according to formulations

Feeding procedure

Feed were supplied to birds as per breeders' instructions. Before the onset of production, the amount of feed supplied to the birds dependent on age and body weight. When the birds came into production, the amount of feed was adjusted on the basis of percent production obtained from experimental bird. Feed were supplied to the birds once a day, which was early in the morning. Feeds were supplied in the round feeder made of plastic materials. Two feeders were used in each pen, which was sufficient for 12 female birds.

As the composition of male feed was different from female breeder diet, the male feeds were supplied separately. One round feeder was placed in each so high enough that the female birds could not feed but the female consumed feed from the particular feeder. As the male birds were larger than female birds, there was no problem in separate feeding. From the feeder provided for female, male could not obtain feed due to gril used in those feeders.

Watering procedure

Normally water was supplied to the birds three times a day to full fill their requirements. When the weather becomes hot, the excess amount of water was provided specially when the temperature exceeded 25^0C. Clean, cool and fresh tube-well water was always provided to the birds. The multi-vitamin powder also provided with the drinking water. For all birds (both males and females) situated in a pen, only a round waterer made of plastic materials was used.

Litter management

A mixture of sawdust and sand were used for litter. At the initial stage of experiment each pen was prepared for chickens providing sawdust at 4-5 cm in depth. Later both the sawdust and sand was added to all pens, when required. When the new litter was added with the remaining, the damp portion of litter including droppings materials removed, and disposed first and then the new litter was added to increase the depth of the litter. Due to removal of damp litter and addition of new ones birds were comfortable, moisture content of litter was reduced and soiled eggs also reduced.

Bio-security measures

Strict bio-security measures were taken for the breeder birds from procurement to end of the experiment i.e. birds were procured from reputed farms, vaccination were run properly, entrance of personnel's were prohibited. For cleaning and disinfection purpose necessary measures and proper disinfectant and necessary clothing's were used. The birds were kept different from other birds and the shed and surroundings were kept clean.

Lighting management

Bore the start of the experiment, lighting program was appropriate for both the strains. After 22 weeks to end 15-16 hours of light were maintained and lighting hours was adjusted depending on the day length period. Additional artificial light was provided with the natural daylight to fulfill the recommended light period.

Medication and vaccination

Though the experimental birds were not affected by serious illness but some water soluble vitamins, electrolytes were provided to meet up the requirement of laying breeders and de-worming procedure were run to overcome the worm infestations. Vaccination were completed before the experiment started.

Temperature management

The birds were housed in a open sided house. Environmental temperature was almost satisfactory but sometimes, especially in summer, temperature became high. When the temperature became high (i.e. when exceeded 25^0C) extra clean, cool water was supplied to save the birds from the stressed condition. To reduce the tress, electrolytes was used with the drinking water. The other measures which were taken were use of room ventilator, wet gunny bags on the roof and/or spraying of water on the roof. When the temperature was cold, during the winter, the room heater was used to increase the room temperature and gunny bags were hanged surrounding the room.

Humidity control

Over the experimental period, the humidity level was always satisfactory. So, humidity control was not required. The satisfactory level of relative humidity for birds is 60-65 % but observed humidity level was 55-80% that was almost satisfactory.

Air flow (Ventilation)

As open sided house was used for the experimental birds, air control was not required. Free air was allowed to move inside and naturally, so that adequate ventilation was made possible when required.

Introduction of male in the flock

At 30 weeks of age, when the birds come to 25% production, males were introduced gradually for breeding purpose.

Post-mortem examination (Autopsy)

Dead birds were brought to the pathology laboratory and post mortem examination (autopsy) was carried out to investigate the real cause of death. The dead birds were subsequently disposed off properly.
Hatching management

Collection of eggs

Eggs were collected from the laying pens once a day, which was at 1 PM. It was carried out manually the eggs were kept in egg trays after collection, eggs were cleaned with shirish paper and hold up. During collection broken eggs and soft shelled eggs were also collected and disposed properly.

Selection for hatching eggs

For hatching purpose, the clean, good, medium weighed and well shaped eggs were selected. Every day, when the eggs were collected, the dirty, off-shaped, cracked and other abnormal eggs were culled and good eggs were selected.

Holding of hatching eggs

After selection of hatching eggs, the settable eggs were stored for 3-7 days at room temperature, and then incubated. Settable eggs were kept with special care during storing.

Setting of eggs

From the selected stored eggs, the equal number of eggs for each replication were taken randomly and weighed. Finally before setting, the eggs were again checked, weighed and then incubated for hatching.

Incubator environment

The incubator which was selected for hatching the eggs was Automatic Electric Jamesway incubator, where the temperature, humidity and ventilation control and turning were performed automatically. So, no problem was created. When the electricity failed, the power was provided by standby generator.

Candling of eggs

Candling was carried out in the dark room with hand candler powered by electricity, which was two times in the incubation period (i.e. at 7th day and at 14th day of incubation). By candling the infertile clear eggs and egg with dead embryo were taken out from the setting tray and recorded as per replication.

Transfer of eggs to the hatcher

At the 18th day of incubation the eggs were transferred to the hatcher from the setter carefully expending minimum time.

Reception of chicks from the incubator

At 21st day of incubation the hatching tray from the incubator were carried out from the incubator and checked about their hatching condition. The chicks which were hatched were weighed and healthy chicks were carried out to the broiler houses in clean boxes and abnormal chicks were destroyed. The remaining eggs were kept for another days inside the incubator. In the next day, above work was repeated and finally the remaining eggs were checked about and their condition was recorded.

Record keeping

Temperature

Temperature was recorded for the house was also taken. The temperature was read four times a day i.e. at 6 AM, 12 AM, 6 PM and 12 PM. The average temperature records are given in Appendix Table 29.

Humidity

To measure the humidity level in the experimental house dry and wet bulb thermometer was used and from the difference of dry and wet bulb thermometer reading humidity percent was determined. Humidity percent was also recorded four times a day i.e. at 6 AM, 12 AM, 6 PM and 12 PM.

Survivability

Mortality when occurred was recorded. From the record the survivability was calculated for each treatment and replication.

Fertility of eggs

After candling of eggs the infertile and clean eggs were identified and deducted from the setting eggs and fertility was calculated.

$$\text{Fertility \%} = \frac{Number\ \ of\ eggs\ set - Number\ \ of\ infertile\ \ eggs}{Number\ \ of\ eggs\ set} \times 10$$

Or

$$\text{Fertility \%} = \frac{Number\ \ of\ fertile\ \ eggs}{Number\ \ of\ eggs\ set} \times 100$$

Hatchability of eggs

After hatching the chicks were received from the incubator. The healthy chicks were stored and counted for healthy chicks, sticky chicks, abnormal chicks and dead in shell. Then hatchability was calculated.

$$\text{Hatchability \%} = \frac{Number\ of\ chicks\ hatched}{Number\ of\ \ fertile\ eggs} \times 100$$

Day-old chicks' weight

The stored healthy chicks were weighed replication wise that were obtained from the breeding flock. The records of weight were kept separately for each replication.

Duration of the experiment

Duration of the experiment was 20 weeks (22-42 weeks of age)

Calculation of data

The following variables were determined after calculations.

- Fertility
- Hatchability and dead in shell, sticky chicks and other abnormalities
- Survivability percent
- Weight of day-old chicks
- Statistical analysis

Collected data were analyzed statistically in a Complete Randomized Design (CRD) using MSTAT statistical computer package program. Significant differences among the means were separated by least square design (LSD).

Results and discussion

Fertility

The fertility for strain 1 was 77.5, 92.65 and 80.76 for overweight, standard weight and underweight groups. The fertility was higher for standard weight groups in comparison with other two treatment groups (Figure 1) but it did not differ significantly. Though it did not differ significantly the figure 1 shows highest fertility level in standard weight groups and lowest in over weight treatment groups. Heavier treatment groups had fertility minimum and this type of result was also reported by Robinson and Wilson (1996). He discussed that excess of weight hinders the ability of the female to complete the successful mating. Problems or relative size between male and female, or of physical ability due to foot problems were common in over weight birds. This interferes with normal mating. He again stated that in female it may be much more difficult for the sperm cell to arrive to the upper portion of the oviduct and fertilize the oocyte before the albumen starts being deposited. It has also been proven that over weight female have diminished capacities for sperm storage since here sperm storage glands were surrounded with and contracted by fat and there were also fat globules present internally.

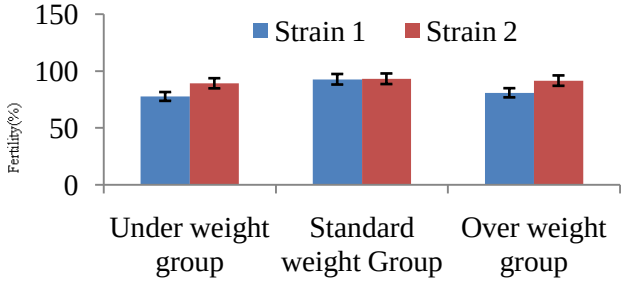

Figure 1: Fertility% of strain 1 and strain 2 for different treatment groups

In case of srtain 2, the fertility was 89.12, 93.09 and 91.46% for the above mentioned three treatment groups respectively. In this case, though the fertility did not differ significantly, the fertility was higher for standard weight group and also lower for overweight group which followed similar trend as found in strain 1. Lilburn and Myers-Miller (1990) indicated that fertility was minimum for overweight birds, which was in agreement with the result of the current study.

Depending on above discussion it may be stated that the body weight had no significant effect on the fertility.

Hatchability

In strain 1, the hatchability result in relation to fertile eggs were 81.6, 79.3 and 80.4% (Figure 2) and in relation to total eggs were 63.7, 63.3 and 63.8% (Table 3) for overweight, standard weight and underweight group respectively. The factors that affect fertility ultimately affect the hatchability rate. In this experiment, like fertility, the body weight treatment groups did not affect the hatchability. Robinson and Wilson (1996) indicated that heavier birds reduced fertility and hatchability significantly and Robinson and Wilson (1996) also mentioned that overweight of broiler breeder was associated with significant reduction in hatchable eggs but the result obtained by this study disagreed with those observations.

In case of strain 2, the hatchability percent in relation to fertile eggs were 69.8, 74.8 and 68.0% (Figure 2) and in relation to total eggs were 66.8, 68.2 and 62.3% (Table 4) respectively for the three treatment groups already mentioned. There were no significant variations among the treatment groups. Sparlt and Lesson (1987) disagreed with the result and they said excessive body weight in broiler breeder female is negatively correlated with hatchability.

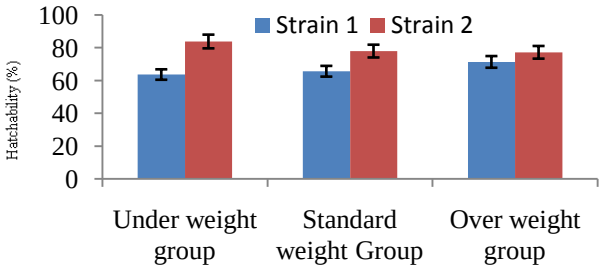

Figure 2: Hatchability% of strain 1 and strain 2 for different treatment groups

For both strains, body weight did not affect hatchability percent. The obtained fertility for broiler breeder for all the treatment was within the acceptable ranges. Islam et al. (2007) reported that among the different broiler stains fertility and hatchability differed significantly and on the other hand Kayagisiz et al. (1994) reported hatchability from fertile eggs as 84, 70, 69, 74, 77 80 and 54% in

one experiment stored for 1,2,3,4,5,6 and 7 days respectively. In this study, slightly lower hatchability was observed for strain-2 that was probably due to storage condition and the environmental temperature which was high on that storage period. The hatchability percent of strain-1 was almost similar to the study carried out by Kayagisiz (1994), and was satisfactory. In this study, the eggs obtained from 38 weeks-aged birds were selected and set for hatching. Peebles and Brake (1987) said that hatchability of chicken eggs decreased after peak production.

Other hatching abnormalities

Other hatching abnormalities also studied in this experiment, which were dead in shell, sticky chicks and other abnormal chicks. For strain-1, dead-in-shell were 5.49, 7.14 and 8.93%, sticky chicks were 0.5, 0.75 and 2.36% and other abnormal chicks were 4.6, 3.7 and 1.85% for the over, standard and underweight treatment groups (Figure 3).

Table 3: Hatching characteristics of strain-1 (Starbro**)**

Variabe	Overweight group	Standard weight group	Underweight groups	Level of significance
Hatchability (%)				
From fertile eggs	81.59	79.30	80.42	NS
From total eggs	63.65	63.39	63.82	NS
Day-old chick weight	50	50.62	49.75	NS

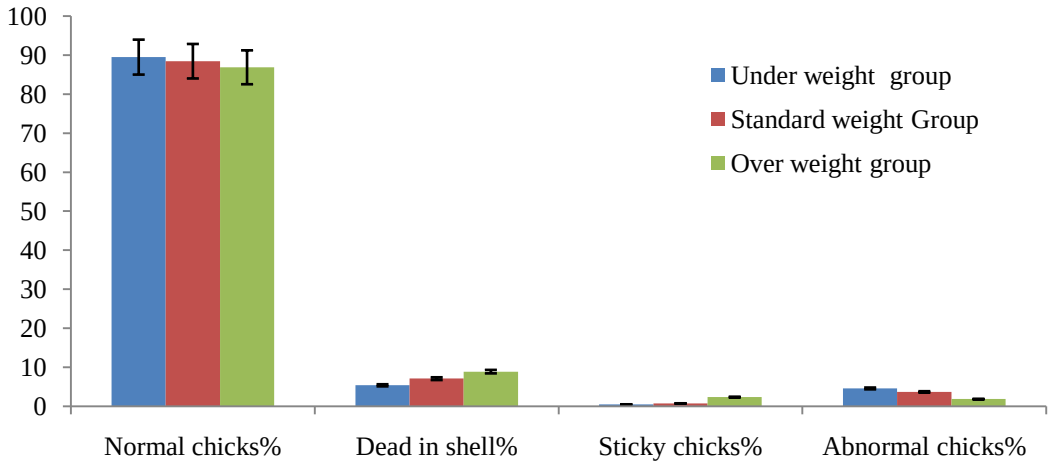

Figure 3: Normal chicks and other abnormal chicks percent of strain 1 for different treatment groups

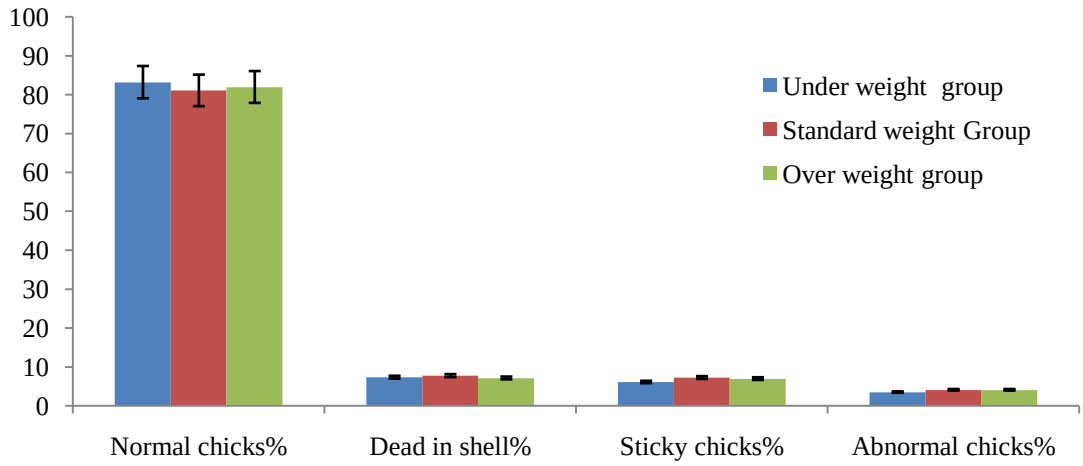

Figure 4: Normal chicks and other abnormal chicks percent of strain 2 for different treatment groups

Table 4: Hatching characteristics of strain-2 (ISA 30 MPK)

Variable	Overweight group	Standard weight group	Underweight groups	Level of significance
Hatchability (%)				
From fertile eggs	69.88	74.81	68.03	NS
From total eggs	66.83	68.21	62.33	NS
Day-old chick weight	43.67	44.54	43.25	NS

For strain-2, dead-in-shell was 7.3, 7.7 and 7.1%; sticky chicks were 6.1, 7.2 and 6.9% and other abnormal chicks were 3.5, 4.0 and 4.0% for over, standard and underweight groups respectively (Figure 4).

Day-old chick weight

Day-old chick weight was also determined of parent performance characteristics and day-old chick weight indicates the commercial broiler characteristic obtained from a particular parent line. As one of the hatching characters, day-old chick weight also studied. Among different weight groups the chick weight did not differ significantly i.e. body weight treatment groups did not affect chick weight. The day-old chick weight for strain-1, was 50, 50.6 and 49.7 g respectively for the treatment groups (Table 3). Though the body weight treatment did not affect the day-old chick weight, the day-old chicks obtained from the strain was higher than the chicks obtained from the strain 2 (Table 4). Duman and Sekeroglu (2017) concluded that the lower weight eggs produced lower weight chicks relation and normal weight chicks from medium weight eggs.

Conclusions

Both the overweight and underweight birds produced significantly lesser number of eggs than the standard weight groups. The fertility and hatchability were slightly lower in overweight and underweight birds and standard weight group showed higher value. Other hatching characters like dead in shell percent, sticky chicks' percent, other abnormal chicks' percent and day-old chicks' weight showed satisfactory results for both the strains.

There was a slight variation in fertility, hatchability and for other traits between the strains. The natures of the results in both strains were more or less similar. On the basis of the result of this study the following were concluded.

1. The fertility and hatchability were good in the standard weight groups but did not vary significantly among the treatment groups.
2. The birds within the recommended body weight and the body weight within ±10% of the standard birds, which were considered in this experiment as standard group performed better. Such body weight group should be maintaining under Bangladesh conditions to obtain good potentiality from broiler parents.

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