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# LAYING BEHAVIOUR OF EGG AND MEAT TYPE CHICKEN AS INFLUENCED BY NEST TIER

**B. Roy[1], M. A. Ali[1], P. K. Sarkar[2], P. K. Sarker[3], M. H. Kawsar[2] and M. Shah Alam[4]**

*[1]Department of Poultry Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh, [2]Department of Dairy and Poultry Science, Patuakhali Science and Technology University, Babugonj, Barisal-8210, Bangladesh, [3]Instructor (Poultry Rearing and Farming), Parbotipur Technical School and College, Parbotipur, Dinajpur, Bangladesh, [4]Department of Pathology and Parasitology, Patuakhali Science and Technology University, Babugonj, Barisal-8210, Bangladesh*

**Corresponding author:- prodip_bau@yahoo.com*

An experiment was conducted to know the laying behaviour of egg and meat type chicken as influenced by nest tier. Two hundred and sixteen hens of two different strains; Commercial Layer (CL) and Synthetic Broiler Breeder (SBB) hens aged 35 weeks were randomly distributed in 4 pens. Six additional males were added with synthetic females to each pen to obtain hatching eggs. The three tier nest having rice husk as nesting material was placed in each pen to observe choice of nest to lay eggs, egg weight, and time spent for laying, and incidence of egg breakage of egg and meat type chickens. The cleanliness of floor egg and nest laying egg was also evaluated. Results indicated that heavier eggs were laid in 1st and 2nd tier than that of 3rd tier in both the strains. CL laid more eggs in 3rd tier than that of SBB. The provision of three tier nests will produce more clean egg in CL than that of SBB. More clean eggs were found in the nest in CL as compared to SBB. Three tier nests seem to be more suitable for commercial layers than for synthetic broiler breeders.

**Key words:** Commercial layer, Synthetic Broiler Breeder, Nest tier, Laying

Poultry is an emerging and important sector that has been contributing progressively to our economy for the last two decades. Poultry is one of the fast growing industries in our country. The annual growth rate of 20% was achieved in the past decade and at present the annual production of parent chicks stands at 2.2 millions in Bangladesh (Rahman, 2007). Hatching performance of eggs depends on a number of factors like genotype, physiological factor, social factors, environmental factor and laying behaviour. Floor eggs are major concern in breeding flock as it may cause unprofitable farming (Anonymous, 1982). Floor eggs are dirty, unhygienic and may reduce hatchability (Hodgetts, 1981) and are not suitable for hatching. Floor laying is influenced by a number of poorly understood factors. The main factors are litter, nest and nesting materials. Other factors are management, farming pattern, environment and farming condition (Appleby *et al.*, 1988).

Laying behaviour of hens is influenced by flock mates, first few hens are come into lay could leads to high or low levels of floor egg, however differ between strains. Floor laying is heritable and selection is effective against the trait (Appleby *et al.,* 1986). Islam (1995) compared four nesting materials; rice husk, chopped rice straw, sand and saw dust for egg laying behaviour and showed that choice of nest for laying was influenced by nesting materials in breeding hens. He also showed marked effect of litter type on floor laying. Eggs laid on the floor, instead of nest boxes, are major economic problems in breeding flocks housed on deep litter.

As floor eggs are not suitable for hatching; these are sold in the market as table eggs. The production cost of hatching eggs are more than that of table eggs. The hatching eggs sold in the same price of table eggs is not economic. Moreover, eggs laid on the

  

floor when broken down, damages the litter materials and may create egg eating problem. Dirtiness of floor eggs can be cleaned by washing or dry cleaning, but these methods of cleaning do not improve the hatching and may even lower the hatchability. Floor laying is partly caused by the failure of some hens to learn to perch before point of lay, and hence to reach raised nest boxes (Appleby *et al*., 1986). Floor laying may be substantially reduced by providing perches in rearing pens and active training e.g. placing hens in nest during the onset of lay. Floor laying is heritable and selection is effective against the trait. It has been increased in inbred lines of hens (McGibbon, 1976). The incidence of floor laying appears to be higher in heavier breed than in lighter breeds (Appleby, 1984). Floor laying differs between strains. Among breeding stock, broiler breeders lay more floor eggs than layer breeders (Brocklehurst, 1975). In laying strains, medium hybrids lay on the floor more than light hybrids.

The colour in the nest box also reduced the number of floor eggs, especially at the beginning of the first laying period. Nesting materials have some effect on cleanliness of eggs. A number of nesting materials have been used for the production of eggs. The preference of the hen for these various materials has been found to vary significantly. Poultry farming in Bangladesh is under development stage. Most of the farms facing problem of floor laying. However, research reports on the causes and remedies of floor laying under Bangladesh condition are very limited. Egg laying behaviour of synthetic broiler breeder and commercial layer has not yet been studied in Bangladesh. Information on the comparison of the egg laying behaviour of the synthetic broiler and commercial layer would be helpful for both breeder and commercial farmer. Influence of nest tier on floor laying and consequent proportion of eggs laid in nest has not been investigated. So, the present study was designed to know the choice of nest tier and compare the clean and dirty egg production between egg and meat type chicken.

## MATERIALS AND METHODS

### Layout of the experiment

Two hundred and sixteen hens of commercial layer (CL) and synthetic broiler breeder (SBB) aged 35 weeks were randomly distributed in four pens, while with synthetic females additional males were added in each pen to have hatching eggs. A three storied multiple community nests having 6 nesting units in each tier was placed in each pen. Thus a nest box placed in each pen and had 18 nests box unit. Layout of the experiment showing Strains (S); Commercial Layer (CL) and Synthetic Broiler Breeder (SBB) having the opportunity to lay to nest tiers (T) with their replication (R)

| S | T | R | | | | | |
|---|---|---|---|---|---|---|---|
| CL | 1 | 1 | 2 | 3 | 4 | 5 | 6 |
| | 2 | 1 | 2 | 3 | 4 | 5 | 6 |
| | 3 | 1 | 2 | 3 | 4 | 5 | 6 |
| SBB | 1 | 1 | 2 | 3 | 4 | 5 | 6 |
| | 2 | 1 | 2 | 3 | 4 | 5 | 6 |
| | 3 | 1 | 2 | 3 | 4 | 5 | 6 |

### Sources of experimental birds

The commercial brown layers (Starcross 579) and synthetic broiler breeders were collected from Poultry Development Project, Department of Poultry Science, Bangladesh Agricultural University, Mymensingh.

### Preparation of experiment house and laying nest

The experiment was conducted in two open sided houses. The house was washed and cleaned properly to make it free from dust, dirt and all kinds of unexpected materials. Then rice-husk was used as a litter material at a depth of 6 cm. The nests were made with G.I. sheet (tin) and wooden materials. The nests were prepared in such a dimension that the boxes had adequate space inside. It was multiple three tier nest having 6 boxes in each tier and total 18 nests. The measurement (Length × Width × Height) of each nest box was 35 × 30 × 30 cm. Hen and nest box ratio was 5:1. The nests were placed at middle of the pen near to the back wall.

### Feeding and watering of birds

A commercial layer diet was fed to laying flock, while broiler breeder diet was fed to the synthetic meat type breeding flock. The

 

feed was procured from Aftab Bahumukhi Farms Limited, Bhagalpur, Bajitpur, Kishoregonj. The feed was supplied according to the birds' requirement and increased gradually with the increase egg production to fulfill their requirement. Feed was supplied twice (morning and evening) daily for the layer flocks and once in the morning for the synthetic broiler breeder throughout the experimental period. Clean and safe drinking water was provided all the times.

**Lighting**

All birds were exposed to a continuous lighting of 16 hours (natural light, about 11 hours and artificial light, about 5 hours). 100 watts bulbs were hanged 2 m above the floor for providing artificial light at night.

**Determination of egg quality**

The eggs were categorized into three classes' i.e. clean eggs, slightly stained eggs and dirty eggs depending on cleanliness of eggs. Egg shell free from foreign materials and visible strains or discolorations were considered as clean egg (AA and A Quality); egg shell free from adhering dirt, but slightly stained were considered as slightly stained egg (B quality) and egg shell with dirt or foreign materials, or having prominent strained were considered as dirty egg.

**Record keeping and statistical analyses**

The eggs were collected thrice daily for the period of 60 days. Egg production (floor egg and nest laid egg), choice of nest ($1^{st}$ tier, $2^{nd}$ tier and $3^{rd}$ tier) and clean egg production for both floor and nest (dirty egg, slightly stained and clean egg) were recorded and calculated for comparing the laying behaviour of commercial layer and synthetic broiler breeder. The collected and calculated data on strain (S), nest tier (NT) were analysed in 2 (s) × 3 (NT) factorial experiment in a Completely Randomized Design. The variances of different parameters partitioned into S, NT, S×NT, and Error to compare the treatment means. There were some missing values in $3^{rd}$ tier. So, a generalized linear model in SAS programme (1986) was used. For the floor laying T-test was used for comparing between strains.

**RESULTS AND DISCUSSION**

The egg production and egg laying behaviour of commercial layers and synthetic broiler breeder are presented in Table 1 and 2.

**Choice of nest (%) to lay egg**

It is evident (Table 1) that commercial layer gave more eggs than that of synthetic broiler breeder. The results agreed with Chowdhury *et al.* (1983) who reported that lighter breed WLH produced more eggs than that of heavier RIR breed. On the other hand, both the strains laid more eggs in the nest than that of floor.

The commercial layer laid at the rate of 83 per cent in the nest while in synthetic broiler breeder it was 58 per cent of the total eggs and the difference was significant ($P \leq 0.01$). The commercial layer laid 40.07, 28.14 and 14.79% eggs in the $1^{st}$, $2^{nd}$ and $3^{rd}$ tier respectively and egg production pattern differed significantly ($P<0.01$).

The synthetic broiler breeder laid 32.84, 22.05 and 3.11% eggs in the $1^{st}$, $2^{nd}$ and $3^{rd}$ tier respectively. Hens prefer to lay more eggs in the lower tier than the top tier in both the strains. The CL laid more eggs in $1^{st}$ and $3^{rd}$ tier than that of SBB and the difference was significant ($P<0.05$). The results are consistent with Nahar (2004) and Islam (1995). Nahar (2004) reported that more eggs were laid in bottom tier than that of top tier. The egg production pattern of synthetic broiler breeder differed significantly between tiers ($P<0.01$). A higher number of eggs laid in $1^{st}$ tier by SBB. This might due to their heavier body weight. The interaction effect of strain and nest tier to lay eggs was significant ($P \leq 0.01$).

**Floor eggs**

The commercial layer and synthetic broiler breeder laid at the rate of 17 and 42 per cent of the total eggs laid. Synthetic broiler breeder produced more eggs on floor as compared to commercial layers. The results are consistent with Appleby *et al.* (1984) who stated that incidence of floor laying was higher in heavier breeds, particularly, broiler breeders than in Leghorn layer strains. Brocklehurst (1975) recorded higher floor laying in broiler breeder than in layer breeders.

 

Table 1. Floor and nest laid eggs by Commercial Layer (CL) and Synthetic Broiler Breeder (SBB) as % of total eggs laid

| Parameter | Strain (S) | Total egg production (%) | Floor eggs (%) | Nest eggs (%) |
|---|---|---|---|---|
| Egg production (%) | CL | 74 | 17 | 83 |
| | SBB | 52 | 42 | 58 |
| | Mean | 63 | 29.5 | 70.5 |

**Egg weight**

The synthetic broiler breeder laid heavier (P>0.05) eggs than that of commercial layers. However, there was a tendency to lay heavier eggs in 1st tier than that of 3rd tier (P<0.05). The results agreed with Islam (1995), Ali (1988) and Connie *et al.* (1985). They reported that RIR laid heavier eggs (53.84g) than that of WLH breeds (53.84g) and were less interested to go to the upper tiers to lay their eggs. Connie *et al.* (1985) also reported that heavier birds produce larger eggs. In this study, eggs laid in the 1st tier were significantly heavier than that laid in 3rd tier (Table 2). The interaction of egg weight of strains on nest tier was non-significant.

**Time spent for laying eggs**

Hens spent more time in laying in the floor than nest. However, time spent in laying did not differ significantly between strains (P≤0.05). Both commercial layer and the synthetic broiler breeder spent more time in 3rd tier than that of 1st & 2nd tier and the difference was significant (P<0.01). Time spent difference among tiers was significant only in SBB (P<0.05). The results agreed with Nahar *et al.* (2004) and Islam (1995). Islam (1995) stated that the height of the nest may be responsible for taking variable time between top and bottom tiers.

**Cleanliness of egg**

The effect of strains and cleanliness of egg laid in nest and on floor are presented in table 3.

Table 2. Interaction of Strains; Commercial Layer (CL) and Synthetic Broiler Breeder (SBB) and Nest tier (NT) on choice of nest to lay eggs

| Parameter | Strains (S) | Nest tier (NT) | | | | LSD (SED) & Significan | | |
|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | Mean | S | NT | S×NT |
| Choice of nest (%) | CL | 40.07 | 28.14 | 14.79 | 27.67 | 2.590** | 3.681** | 3.753* |
| | SBB | 32.84 | 22.05 | 3.11 | 19.33 | | | |
| | Mean | 36.46 | 25.09 | 8.95 | 23.50 | | | |
| Egg weight (g/egg) | CL | 58.62 | 55.34 | 53.25 | 55.74 | (2.225)NS | 1.899** | (2.523 |
| | SBB | 60.52 | 61.23 | 58.36 | 60.04 | | | |
| | Mean | 59.57 | 58.29 | 55.81 | 57.89 | | | |
| Time spent for laying (Min./egg) | CL | 3.52 | 3.95 | 4.15 | 3.87 | (0.129)NS | 0.548** | 0.559* |
| | SBB | 3.86 | 4.15 | 4.58 | 4.20 | | | |
| | Mean | 3.69 | 4.05 | 4.37 | 4.04 | | | |

NS, P>0.05; *, P<0.05; **, P<0.01

 

Table 3. Effect of Strains (S); Commercial Layer (CL) and Synthetic Broiler Breeder (SBB) on cleanliness of eggs laid in nest and on floor

| Parameter | Strains (S) | Total egg production | Floor eggs | Nest eggs |
|---|---|---|---|---|
| Clean egg production (%) | CL | 80.28 | 20.35 | 59.93 |
| | SBB | 70.64 | 22.32 | 48.32 |
| | Mean | 75.46 | 21.33 | 54.13 |
| Slightly stained egg production (%) | CL | 12.77 | 8.27 | 4.50 |
| | SBB | 16.27 | 11.95 | 4.32 |
| | Mean | 14.53 | 10.36 | 4.17 |
| Dirty egg production (%) | CL | 6.94 | 5.28 | 1.66 |
| | SBB | 13.09 | 8.92 | 4.17 |
| | Mean | 10.02 | 6.85 | 3.17 |

Table 4. Effect of strains; Commercial Layer (CL) and Synthetic Broiler Breeder (SBB) on nest laying and its effect on clean egg production

| Parameter | Strains (S) | Nest tier (NT) | | | | LSD (SED) & Significant | | |
|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | Mean | S | NT | S×NT |
| Clean egg production (%) | CL | 94.10 | 94.58 | 97.26 | 95.31 | $(0.256)^{NS}$ | $0.613^{**}$ | $(0.317)^{NS}$ |
| | SBB | 86.52 | 90.61 | 89.78 | 88.97 | | | |
| | Mean | 90.31 | 92.60 | 93.52 | 92.14 | | | |
| Slightly stained egg production (%) | CL | 2.26 | 2.59 | 1.21 | 2.02 | $(0.537)^{NS}$ | $0.145^{**}$ | $(2.101)^{NS}$ |
| | SBB | 6.25 | 5.10 | 7.59 | 6.31 | | | |
| | Mean | 4.26 | 3.85 | 4.40 | 4.17 | | | |
| Dirty egg production (%) | CL | 3.53 | 2.83 | 1.53 | 2.63 | $(0.135)^{NS}$ | $2.578^{**}$ | $(1.357)^{NS}$ |
| | SBB | 7.23 | 4.29 | 2.63 | 4.72 | | | |
| | Mean | 5.38 | 3.56 | 2.08 | 3.68 | | | |

NS, P>0.05; *, P<0.05; **, P<0.01

The commercial layer laid 80.28, 12.77 and 6.94 per cent clean, slightly stained and dirty egg respectively where as the synthetic broiler breeder laid 70.64, 16.27 and 13.09 per cent respectively accordingly to the cleanliness of egg. Commercial layers had a tendency to produce more clean eggs than that of synthetic broiler breeder and eggs laid in nest were cleaner than floor eggs. Commercial layer had a tendency to lay significantly (P≤0.05) higher clean egg in 3rd tier than that of 1st & 2nd tier. The interaction of strains and nest tier had no appreciable effect on clean egg production (P>0.05). Synthetic broiler breeder had a tendency to produce more slightly stained eggs than that of commercial layers. The eggs laid on floor are more stained than nest eggs in both the strains. Synthetic broiler breeder had tendency to produce more dirty eggs as compared to commercial layers (P<0.05) and produced more dirty eggs in 1st tier than that of 2nd & 3rd tier (Table 4) and the difference was significant (P≤0.05). The results agreed with Enlhardt *et al.* (1989). They reported that eggs laid outside the nests (floor eggs) easily become dirty or broken.

**Incidence of floor laying & egg breakage**

The CL and SBB laid 11.01 and 23.26% eggs on the floor respectively and among them 2.56 and 4.98% eggs were broken respectively while on nest laying, 0.56 and 1.98% eggs were broken in CL and SBB respectively (Table 5). This indicates that relatively SBB had higher floor laying and consequently a higher incidence of egg breakage than those of CL. The results agreed with Islam (1995) and Appleby *et al.* (1984). Appleby *et al.* (1984) suggested that

 

positive relationship of body weight with floor laying may be more applicable to broiler parent stocks.

Table 5. Incidence of floor and nest laying and egg breakage

| Strain (S) | Parameter % | | | |
|---|---|---|---|---|
| | Floor laying | Egg breakage | Nest laying | Egg breakage |
| CL | 11.01 | 2.56 | 88.99 | 0.56 |
| SBB | 23.26 | 4.98 | 76.74 | 1.98 |

## CONCLUSIONS

On the basis of results of laying behaviour of egg and meat type chicken, it was concluded that both commercial layer and synthetic broiler breeder might prefer to lay eggs in the lower tier of the nest than that of upper tiers and floors whereas more cleaner eggs could be obtained from upper tiers than that of lower tiers and eggs laid on floor.

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