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Production of *Bambusicola thoracicus* under the Influence of Light Intensity and Photoperiod

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ABSTRACT

Influence of photoperiod and light intensity on *Bambusicola thoracicus* was studied, whereby One Hundred birds were distributed into 5 treatment groups *viz*. A1, A2, B1, B2 and C. The birds in group A1 were treated with light intensity of 80 luxes/8 hours during growing period and 240 luxes/16 hours during laying period, group A2 with light intensity 20 luxes/8 hours during growing period and 60 luxes/ 16 hours during laying period. Birds in group B1 were provided photoperiod of 5 luxes/16 hours during growing and 15 luxes/20 hours during laying period, while in group B2 photoperiod of 5 luxes/12 hours during growing and 15 luxes/18 hours during laying period was provided. Group C was kept as control group. Results indicated average body weight of group A1, A2, B1, B2 and C, 196.25; 192.24; 186.98; 190.00 and 190.44g/b respectively, feed intake 202.13; 211.98; 230.11; 212.25 and 207.11g/b respectively. The FCR was recorded best in group A1, while carcass weight (99.57g), dressing percentage (52.02%) and egg length (33.11mm) was found higher in group A2. Average egg production percent was higher in group B1 (70.24), egg width in A1 (24.89) respectively. Study concludes that the Bambusicola thoracicus reared under 80 luxes light intensity for 8hrs per day during growing period and 240 luxes light intensity for 16hrs per day in laying period showed better FCR and feed intake, however egg production was observed better when birds were provided 5 luxes for 16hrs photoperiod during growing and 15 luxes for 20hrs photoperiod during laying period.

Key words: Growth, Intensity, Light duration, Production.

INTRODUCTION

Bambusicola thoracicus are small game birds thought are commonly used for commercial production in term of eggs and meat (Onyewuchi *et al*., 2013). These birds are known as migratory birds as they migrate from Europe to Asia and Asia to Europe (Saidu *et al*., 2014). *Bambusicola thoracicus* are blessed with many desirable characteristics like rapid growth rate, early sexual maturity, high egg production rate, shorter generation interval, small space requirement, less feed requirement, short incubation period and less susceptibility to common chicken diseases (Faitarone *et al.,* 2005; Jatoi *et al.,* 2013). Sexual maturity age of these birds is much smaller, females matures at the age of approximately 6 weeks and usually in full egg production stage by 50 days. As they can produce up to four generations per annum therefore are most suitable and effective bird in poultry industry now days. The live body weight of mature female *Bambusicola thoracicus* ranges from 120 to 160g, while mature male ranges from 110 to 140g. They lay 75% of their eggs between the time of 3 and 5 P.M. Incubation period of *Bambusicola thoracicus* egg ranges from 17 to 18 days (Ojedapo *et al*., 2014).

Being a smallest member of poultry and possession of above said characteristics, *Bambusicola thoracicus* are broadly used for eggs and meat production on commercial scale now a days with average eggs production 200/bird/ year. (Minvielle *et al*., 2004, Rahman *et al*., 2010 and). Further, due to encouraging economic traits, farming of these birds also needs much lower capital investment compared to poultry species like chicken, turkeys and duck etc (Minvielle*,* 2002). The transition of backyard to commercial poultry production has resulted in the rearing of *Bambusicola thoracicus* in large barns or brooder houses and that require effective intensive management. In this regards producers are trying to modulate and manipulate environmental factors like temperature, humidity, ventilation, gases, light intensity, light duration and light color. Among all factors, light is assumed to be the most critical factor for *Bambusicola thoracicus* farming. It not only controls various physiological and behavioral processes of bird (Olanrewaju *et al*., 2006) but it may also have significant impact on the production efficiency, behavior, egg production and health status (Mendes *et al*., 2005). Therefore, application of different light regimens were planned in the current study to observe the possible effects on the birds' production performance.

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MATERIALS AND METHODS

Experiment was conducted on a total of Two Hundred and Fifty (n=250) birds. Birds were distributed into 5 groups having 50 birds in each. The birds in group A1 were treated with light intensity of 80 luxes for 8 hours during growing period and 240 luxes for 16 hours during laying period, in group A2 with light intensity of 20 luxes for 8 hours during growing period and 60 luxes for 16 hours during laying period. Birds in group B1 were provided photoperiod of 5 luxes for 16 hours during growing period and 15 luxes for 20 hours during laying period, while in group B2 photoperiod of 5 luxes for 12 hours during growing period and 15 luxes for 18 hours during laying period as provided (Table 1).

Group C was kept as control group and light with 5 luxes for 8 hours during growing period and 15 luxes for 16 hours during laying period was given. Average live body weight (g/b) was calculated by randomly selecting 20 birds from each group and taking their weight weekly using electric weighing balance. Feed intake (g/b) by measuring the offered and refusal feed in 24 hours. Feed conversion ratio (FCR) was calculated dividing the total feed intake by birds with weight gain. Carcass weight (g/b) was measured at the end of experimental period, 5 birds from each group was weighed and slaughtered at the age of 13 weeks. Carcass weight was recorded after dressing. Dressing percentage was calculated by slaughtering the 5 birds from each group at the end of experiment. Dressing percent was calculated by dividing the carcass weight with total live body weight. Egg production (%) was calculated by dividing the total number of eggs produced with total number of birds reared and multiplying with 100. Egg size (mm) by measuring the length and width of the eggs using vernier calipers, however, egg weight (g) was recorded using electric weight balance.

Statistical analysis

Collected data was statically analyzed through factorial design in the Tukey T-paired test, using JMP 9.0.1 software of USA.

RESULTS AND DISCUSSION

Results regarding the average live body weight (g/b) are presented in Table 2. Results indicate that the birds in group A1, A2, B1, B2 and C possessed 196.25, 192.24, 186.98, 190.00 and 190.44g/b average live body respectively. Statistically non-significant ($p>0.05$) difference was found among the all groups. Feed intake (g/b) of *Bambusicola thoracicus* were recorded and reported in Table 2. Average feed intake of birds in group A1, A2, B1, B2 and C was found as 202.13, 211.98, 230.11, 212.25 and 207.11g/b, respectively. Maximum feed were consumed by the birds reared under group B1 followed by B2, A2 (control) and C and minimum by the birds in group A1. Statistically, significant ($p<0.05$) difference between groups B1 and A1 was seen, while non-significant ($p>0.05$) difference was seen in groups A2, B2 and C. Feed conversion ratio of birds were recorded and results are depicted in Table 2. The best FCR was seen in the group A1 (1.04) followed by group C (1.09), group A2 (1.10), group B2 (1.12) and group B1 (1.24). Statistically non-significant ($p>0.05$) difference was seen among all groups against FCR.

Regarding carcass weight (g/b) of *Bambusicola thoracicus* results are given in Table 2. Average carcass weight of *Bambusicola thoracicus* in group A1, A2, B1, B2

Table 1: Light intensitis and photoperiods applied to different treatment groups.

Treatment Groups	Light intensity		Photo period	
	Growing period	Laying period	Growing period	Laying period
A1	80 luxes for 8 hours	240 luxes for 16 hours	-	-
A2	20 luxes for 8 hours	and 60 luxes for 16 hours	-	-
B1	-	-	5 luxes for 16 hours	15 luxes for 20
B2	-	-	5 luxes for 12 hours	15 luxes for 18 hours
C	5 luxes for 8 hours	15 luxes for 16 hours	5 luxes for 8 hours	15 luxes for 16 hours

Table 2: Production parameters of *Bambusicola thoracicus* of different treatment groups.

Parameters	Treatment groups				
	A1	A2	B1	B2	C
Live body weight (g/bird)	196.25^{a}	192.24^{b}	186.98^{c}	190.00^{ab}	190.44^{ab}
Feed intake (g/bird)	202.13^{b}	211.98^{ab}	230.11^{a}	212.25^{ab}	207.11^{ab}
FCR	1.04	1.10	1.24	1.12	1.09
Average carcass weight (g/bird)	98.34^{a}	99.57^{a}	90.6^{d}	92.10^{c}	96.17^{b}
Dressing percentage (%)	50.47^{ab}	52.02^{a}	48.92^{b}	49.16^{b}	50.52^{ab}
Average egg production (%)	50.1^{b}	48.8^{b}	70.24^{a}	69.22^{a}	53.85^{a}
Egg length (mm)	33.11^{a}	33.11^{a}	30.24^{b}	30.11^{b}	30.11^{b}
Egg width (mm)	24.89^{ab}	23.8^{b}	25.15^{a}	24.4^{ab}	24.1^{ab}
Egg weight (g)	9.48^{a}	9.51^{a}	11.33^{a}	10.11^{a}	9.31^{a}

*****Supscripts a-c show significant difference among the treatment groups ($P \leq 0.05$).

and C was recorded as 98.34, 99.57, 90.6, 92.10 and 96.17, respectively. Maximum carcass weight was recorded in group A2 followed by A1, C, B2 while minimum carcass weight was seen in group B1. Carcass weight for group B1 and B2 and C significantly varied from one another but group A1 and A2 showed no considerable difference. Dressing percentage of *Bambusicola thoracicus* were calculated and results are given in the Table 2. Average dressing percentage of *Bambusicola thoracicus* in group A1, A2, B1, B2 and C was found as 50.47%, 52.02%, 48.92%, 49.16% and 50.52%, respectively. Higher dressing percentage was seen in group A2 followed by C, A1 and B2, while lower was observed in group B1. Statistically, significant difference was observed in group A2 compared to other groups, however among group A1, B1, B2 and C non-significant difference was seen.

Average egg production percentage of *Bambusicola thoracicus* were recorded and presented in Table 2. Average egg production of *Bambusicola thoracicus* in group A1, A2, B1, B2 and C was found as 50.1, 48.8, 70.24, 69.22 and 53.85%, respectively during the study period of 13 weeks. Higher egg production was seen in the birds reared under B1 followed by B2, C (control) and A1, while lower egg production in birds reared under A2. Concerning egg length (mm) results indicated group A1, A2, B1, B2 and C having 32.11, 33.11, 30.22, 30.11 and 30.11 mm, respectively egg length. Longer egg length was observed in group A1 followed by A2, B1 and B2, while smaller was seen in group C (control). Average egg width of *Bambusicola thoracicus* in group A1, A2, B1, B2 and C was recorded as 24.89, 23.8, 25.15, 24.4 and 24.1mm, respectively (Table 2). Further, higher egg width was found in group B1 followed by A1, B2 and C, while lower egg width was for group A2. Statistically, there were considerable difference between A2 and B1 groups and non-significant difference between A1, B2 and C groups, correspondingly. Average egg weight in group A1, A2, B1, B2 and C was recorded as 9.48, 9.51, 11.33, 10.11, 9.31g, respectively. Moreover, egg weight was higher in group B1 followed by B2, C and A2 and lower in group A1. Statistically, no significant difference was seen among the groups (Table 2).

In present study, higher average body weight of *Bambusicola thoracicus* were recorded when light intensity of 80 luxes for 8 hours duration was provided and however on the photoperiod of 5 luxes for 16 hours duration lower average body weight was observed. These finding are in agreement with studies of Riber, 2015 and Pieter *et al*., 2013 who reported that the body weight gain rates in birds affects by the photoperiod primarily due to energy expenditure and intake by the *Bambusicola thoracicus*. Puigcerver *et al*., 2007; Lewis *et al*., 2010 also reported relevant types of findings when light regimes restriction in chicken was studied. Live body weight, carcass weight and hen eggs production were considerably influenced with the different light regimes. Further, in another study, feed intake was found maximum at the photoperiod of 5 luxes for 16 hours and minimum at the light intensity of 20 luxes for 8 hours. Benson *et al*., 2013 also reported same kinds of findings when studied broilers in relation to light. They found that the light of energy savers enhances the broiler production. Similarly, Freitas *et al*., 2005 reported that the sufficient light effect in poultry house and birds' growth. FCR was recorded better in group A1 followed by group C, A2, B2 and B1. Current findings regarding the FCR did not match the results of Lucian *et al*., 2012 who otherwise reported no significant differences for broiler feed efficiency against light schedules. Changes in the result may because species difference, different size of experimental birds. Concerning carcass weight results of present study possess similarity with (*George,* 2013) who found that the 16 h-lighting decreased stress in broilers and thus allow increase of carcass weight. Bayram and Ozkan, (2010) found that carcass weight declined with decrease of photoperiod, the effect being more influential in female quails. These finding also support the current study. Further, egg production of *Bambusicola thoracicus* were observed maximum when photoperiod of 15 luxes for 20 hours duration was provided and minimum was seen when light intensity of 6 luxes for 16 hours duration was provided. In support to current findings Blatchford, 2012 and Change *et al*., 2009 report that the reduction in day length delays the onset of sexual maturity and may even terminate egg laying in birds. Findings of Puigcerver *et al*., 2007 also support the present study. They reported that the reduction in light duration result in reduced egg production and laying sequence length.

CONCLUSION

Present study concludes that the light with 80 luxes for 08 hrs intensity during growing period and light with 240 luxes for 16 hrs intensity during laying period possess positive influence on the FCR and feed intake of *Bambusicola thoracicus*. However, light with 5 luxes for 16 hrs photoperiod during growing period and 15 luxes for 20 hrs photoperiod during laying period possess positive influence on the egg production.

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