



Short Research Communication

Growth performance of three broiler strains in winter seasons in Bangladesh

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This study was conducted with a total number of 135 day old broiler chicks were collected from the two breeding hatcheries in Bangladesh. The chicks were placed in an open poultry shed and exposed in winter season. There were three strains Cobb-500, Hubbard Classic and Arbor Acres, 45 of each strain divided 3 groups with 3 replications 15 broilers per pen. The feed intake at first and third weeks of age revealed that highly significant difference ($P < 0.001$) in Cobb-500, Hubbard Classic and Arbor Acres in winter season. There was no significant difference ($P > 0.05$) in live weight among the three broiler strains in winter season. In third weeks the significant difference ($P < 0.01$) also observed body weight gain. The feed conversion ratio (FCR) of three broiler strains at first and third weeks of age in winter season were highly significant ($P < 0.001$). There were no significant difference ($P > 0.05$) of mortality. The dressing percentage differed highly significant ($P < 0.001$) in winter at fourth weeks of age. It's concluded that Hubbard Classic may perform the best in winter than Cobb-500 and Arbor Acres due to dressing yield. Arbor Acres of the later two strains may also be recommended for commercial production on the basis of FCR.

Key words: Growth, performance, broiler, winter, Bangladesh.

INTRODUCTION

The poultry sub-sector is crucially important in the context of growth and improvements of diets of people in Bangladesh. There are 43.2 percent (urban) and 39.5 percent (rural) population live below the poverty line (BBS, 2011) and suffer from serious malnutrition problem. Protein deficiency has been taken as the major contributory factor in malnutrition. The per capita consumption of animal protein in Bangladesh is only 11.80gm per day (BBS, 2011) whereas the standard requirement is 36 gm. The poultry sub-sector can contribute in combating this problem where about 37 percent (Bhuiyan, 1999) of the total animal protein supplied in the country comes from poultry meat.

The poultry is an integral part of the farming system in Bangladesh and it has created direct-indirect employment including support services for about 6 million people. Development of poultry has generated considerable

employment through the production and the marketing of poultry and poultry related products in Bangladesh. Its steady growth results in attaining country's economic growth, which contribute in (i) rural poverty reduction (ii) new employment generation and (iii) improve food security and supply of protein in people meals. In the early 90s, a number of private parent stock poultry farms started their operations to produce commercial broiler and layer Day Old Chicks (DOC).

Broiler has a great demand as compared to other meat, because of the spiritual beliefs as well as religious constraints in the case of port and beef (Jabbar 2004). Most of the people of Bangladesh are non-vegetarian. So, broiler meat is very attractive young segments of urban consumers became habituated in taking broiler meat. Besides, broiler meat is widely using in different restaurants as well as wedding party in Bangladesh. On the other hand, people are

not able to buy indigenous chicken meat, because market price of indigenous chicken is 2-3 times more than that of broiler chicken (Islam et al., 2011; Ahmed et al., 2012). As a result, chicken meat production is increasing tremendously to compare the meat production in different species. The scarcity of fish as well as the rapidly increasing price of beef and mutton for less availability also helped to promotion of broiler rearing. People now prefer poultry meat to beef or mutton because of low cholesterol and low fat contents. Broiler meat is the most desirable source of animal protein and highly accepted by most of the people of Bangladesh irrespective caste and religion. It can efficiently and rapidly fill in the shortage of body requirement. Broiler meat is low in calories in relation to other nutrient rich and thus it is essential for those people who like to control body weight.

Hot-humid environment is a major factor limiting high yielding poultry production in tropical countries (Fox, 1980). Howlader and Rose (1989 & 1992) have shown that high temperature and humidity markedly reduced growth, feed utilization, meat yield and survivability of broilers. Seasons also affect the performance characteristics of poultry. Islam and Howlader (1990) found that broiler performances were poorer in summer and rainy seasons than in winter. Again type of strains also had an influence on productivity of poultry. Akhter (1996) reported that performance of moderately growing ISA757 was superior to the fast growing ISA Vedette in hot-humid environment. The poor performance of fast growing broilers in comparison with slow/moderate growing ones in tropical environment was also reported by others (Bohren et al., 1982). Rahman et al. (1992) found good performance of moderately growing Minibro broiler under hot-humid environment of Bangladesh. Shingari et al. (1975) observed that weight gain in broilers was maximum in cold weather followed by summer, spring and rainy season, while the feed efficiency was found best in summer followed by winter and rainy season. Scott et al. (1982) reported that body weight gain due to maximum feed intake during winter season was regulated by ambient temperature. Season had profound influence on weight gain and feed intake; broilers in winter ranked 1st followed by hot-humid and hot-dry season (Al-Ribdawi and Singh, 1989). The aim of this research therefore, was to compare the production performance of different broiler strains in Bangladesh and to evaluate the suitable broiler strains in winter season.

MATERIALS AND METHODS

A total of 135 day old broiler chicks were collected from the purchasing outlets of two different breeding hatcheries in Bangladesh. The chicks were placed in an open shed house and exposed to two different environmental temperature and humidity in winter season. Chicks as hatched broilers belonging to 3 strains Cobb-500, Hubbard Classic and Arbor Acres, 45 of each strain were reared in winter season; with 3 replications 15 broilers per pen. During the whole experimental period broilers were exposed to a continuous

lighting regime, 23 hours of light and 1 hour of darkness per day. Rice husk were used as a litter at a depth of 7 cm for all the pens. A floor space of 0.97 square ft. /bird was allocated. Data on weekly average feed intake, live weight, weekly body weight gain, mortality, FCR, dressing% and daily environmental temperature and humidity were taken. Broilers were slaughtered at the end of 28 days. Aftab poultry feed was provided to all the birds.

Feeds were provided up to 28 days to make a comparison on their production performances but it was measured by electric balance throughout the experimental period. Broiler starter was fed for 0-2 wks and grower for 3-4 wks of age. It was supplied 4/5 times up to 2 weeks and then 3/4 times in a day. Every morning, feeding measurement was calculated to detect the feed intake. The feed was supplied in tray feeders up to 1 week and then on round plastic trough feeders. The feed consumed by the birds in each replication was recorded per day to detect weekly feed intake. Then the average feed consumption per bird was determined. The feed conversion ratio (FCR) was calculated and recorded by dividing the total feed consumed per bird by average body weight gain.

$$\text{Feed Intake (g/bird)} = \frac{\text{Feed consumption in a treatment}}{\text{No. of birds in a treatment}}$$

$$\text{Feed Conversion Ratio (FCR)} = \frac{\text{Feed intake (kg)}}{\text{Weight gain (kg)}}$$

$$\text{Mortality (\%)} = \frac{\text{No. of birds died}}{\text{No. of birds starting}} \times 100$$

Statistical procedure

The experimental data were analyzed statistically using analysis of variance (ANOVA) technique using SPSS Version 16.00 statistical package program in accordance with the principle of Completely Randomized Design (CRD). Significant difference among the treatments was identified using Duncan's New Multiple Range Test (DMRT). The dressing yield parameters were converted to the percentage of their respective body weight for statistical analysis.

RESULTS

Feed intake

The average feed intake of three broiler strains in different weeks is shown in Table 1. The feed consumption of Cobb-500, Hubbard Classic and Arbor Acres was 89.4g, 107.66g and 104.02g per broiler strain, respectively in first week of age. The highest value of feed intake was 107.66g in Hubbard Classic. The highest feed intake 348.04g was observed in Hubbard Classic broiler strain in second week followed by 332.97g and 331.17g in Arbor Acres and Cobb-500, respectively. The third weeks and fourth weeks feed intake of Cobb-500 were 873.53g and 1649.5g. These were the highest value among the three strains. Since first week to second weeks Hubbard Classic and third weeks to fourth

Table 1. Average feed intake (g/bird) of broiler strains in different weeks of winter season

Week	Strain (Mean \pm SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1 st	89.04 \pm 2.97 ^b	107.66 \pm 1.63 ^a	104.02 \pm 0.86 ^a	1.65	***
2 nd	331.17 \pm 12.19	348.04 \pm 5.00	332.97 \pm 4.37	-	NS
3 rd	873.53 \pm 16.98 ^a	740.90 \pm 12.24 ^b	692.60 \pm 13.37 ^b	11.71	***
4 th	1649.5 \pm 29.29	1534.0 \pm 56.26	1623.3 \pm 57.78	-	NS

Means in the same raw with different superscripts differed significantly, but similar superscripts did not differ significantly. *** = Highly Significant (P<0.001); NS= Non- Significant (P>0.05)

Table 2. Average live weight (g/b) of broiler strains in winter season

Week	Strain (Mean \pm SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1 st	119.22 \pm 5.61	116.27 \pm 3.32	119.78 \pm 1.35	-	NS
2 nd	286.25 \pm 20.83	274.35 \pm 3.72	267.54 \pm 12.45	-	NS
3 rd	627.85 \pm 31.46	617.17 \pm 10.77	675.39 \pm 8.38	-	NS
4 th	1089.6 \pm 88.07	1101.3 \pm 25.76	1178.1 \pm 36.12	-	NS

NS= Non- Significant (P>0.05)

Table 3: Weekly body weight gain (g/b) of broiler strains in winter season

Week	Strain (Mean \pm SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1 st	75.75 \pm 5.41	73.60 \pm 2.83	76.75 \pm 1.96	-	NS
2 nd	167.03 \pm 16.01	158.08 \pm 5.67	147.76 \pm 13.48	-	NS
3 rd	341.60 \pm 10.84 ^b	342.83 \pm 8.69 ^b	407.88 \pm 12.92 ^a	8.94	**
4 th	461.72 \pm 61.87	484.14 \pm 28.24	502.71 \pm 28.31	-	NS

Means in the same raw with different superscripts differed significantly, but similar superscripts did not differ significantly. ** = Significant (P<0.01); NS= Non- Significant (P>0.05)

weeks Cobb-500 was continued the highest feed consumption than other two broiler strains.

Live weight

The live weight of three broiler strains in different weeks of winter season is presented in Table 2. The Arbor Acres was expressed highest body weight 119.78g in first week of age in winter season followed by 119.22g and 116.27g in Cobb-500 and Hubbard Classic broiler strain, respectively. In second week the live weight 286.25g was observed in Cobb-500, 274.35g in Hubbard Classic and 267.54g in Arbor Acres. The third weeks and fourth weeks were also highest body weight 675.39g and 1178.1g in Arbor Acres than the other two broilers strain 627.85g and 1089.6g in Cobb-500; 617.17g and 1101.3g in Hubbard Classic in winter season.

Weekly body weight gain

The weekly body weight gain of three broiler strains is shown in Table 3. The arbor Acres was achieved the highest

body weight 76.75g in first week followed by 75.75g and 73.60g in Cobb-500 and Hubbard Classic broiler strain, respectively. In second weeks Cobb-500 was gain 167.03g body weight; it was the highest value in this week than other two strains. There were 407.88g body weight gains of Arbor Acres in third weeks, 342.83g of Hubbard Classic and 341.60g of Cobb-500. The arbor Acres was also highest body weight gain 502.71g in fourth weeks, besides 484.14g gain in Hubbard Classic and 461.72g gain in Cobb-500.

Feed conversion ratio

In winter season the feed conversion ratio (FCR) of three broiler strains is presented the Table 4. The first week of age of broilers, FCR value of Cobb-500, Hubbard Classic and Arbor Acres was 0.74, 0.93 and 0.87, respectively. The second weeks FCR value 1.27 was highest in Hubbard Classic and lowest 0.91 in Arbor Acres. At the end third weeks of age FCR 1.39, 1.19 and 1.02 were found in Cobb-500, Hubbard Classic and Arbor Acres, respectively. The lowest FCR value at fourth weeks of age was 1.37 in Arbor Acres, highest 1.53 in Cobb-500 and 1.39 in Hubbard Classic.

Table 4. Feed conversion ratio of broiler strains in winter season

Week	Strain (Mean ± SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1 st	0.74±0.03 ^b	0.93±0.02 ^a	0.87±0.01 ^a	0.01	***
2 nd	1.17±0.08	1.27±0.01	0.91±0.07	-	NS
3 rd	1.39±0.06 ^a	1.19±0.03 ^b	1.02±0.02 ^c	0.03	***
4 th	1.53±0.09	1.39±0.03	1.37±0.02	-	NS

Means in the same raw with different superscripts differed significantly, but similar superscripts did not differ significantly. *** = Highly Significant (P<0.001); NS= Non- Significant (P>0.05)

Table 5. Mortality % of three broiler strain in winter season

Week	Strain (Mean ± SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1 st	2.22±2.22	2.22±2.22	0	-	NS
2 nd	2.22±2.22	4.44±2.22	2.22±2.22	-	NS
3 rd	2.22±2.22	4.44±2.22	2.22±2.22	-	NS
4 th	2.22±2.22	4.44±2.22	2.22±2.22	-	NS

NS= Non- Significant (P>0.05)

Table 6. Dressing % of three broiler strains in winter season

Strain	Dressing% (Mean ± SEM)	SED	Level of Significance
Cobb-500	54.59±0.31 ^a		
Hubbard Classic	55.85±0.16 ^a	0.39	***
Arbor Acres	52.29±0.77 ^b		

Means in the same raw with different superscripts differed significantly, but similar superscripts did not differ significantly. *** = Highly Significant (P<0.001);

Table 7. Environmental temperature and humidity in winter season

Parameter	1st week	2nd week	3rd week	4th week
Temperature(°C)	15.29	17.07	11.81	17.69
Humidity (%)	85.14	70.28	79.28	68.43

Mortality

The mortality percentage of three strains in winter season is presented in Table 5. There was 2.22% mortality observed in Cobb-500 and Hubbard Classic but no in Arbor Acres at first week of age. In second weeks the mortality percentages were 2.22 in Cobb-500 and Arbor Acres. This mortality values was fixed in same broiler strain at third and fourth weeks of age except Hubbard Classic. The 4.44% mortality was shown in Hubbard Classic at second weeks of age. This value was fixed in third and fourth weeks of age.

Dressing%

In winter season the dressing percentages of three broiler strains shown in Table 6. The dressing percentage value 55.85 was found in Hubbard Classic. It was the highest values than other two broiler strain followed by 54.59 in

Cobb-500 and 52.29 in Arbor Acres at fourth weeks of age.

Environmental temperature and humidity

The environmental temperature and humidity in different weeks is shown in Table 7. The highest environmental temperature in winter season was 17.69 °C at fourth weeks and lowest was 11.81 °C at third weeks during experimental period. In winter season the highest relative humidity was 85.14% at first week and lowest was 64.43% at fourth weeks.

DISCUSSION

Feed Intake

The first week feed intake, there were highly significant

differences ($P < 0.001$) among the three broiler strain (Table 1). These results were supported by Horniakova (1988). He showed significant differences in feed consumption among strains. He also showed the heavier broiler strain consumed more feed and gain more weight which was reflected both at the starting and finishing stages of growth. These results were also supported by the findings of Islam et al. (2008). There were no significant differences ($P > 0.05$) in three broiler strains at second weeks of age. In third weeks of age feed consumption among the strains differed highly significant ($P < 0.001$). The results of third weeks were the same opinion with the observations of Hossain et al. (2011). These results were also supported the findings of Islam et al. (2008). There were no significant differences ($P > 0.05$) in three broiler strain at fourth weeks of age.

Live weight

There were no significant differences ($P > 0.05$) among the three strains Cobb-500, Hubbard Classic and Arbor Acres in first, second, third and fourth weeks of age (Table 2). These findings were supported the observations of Azad (1996), Hossain et al. (2011), Zullitch et al. (1989) and Makram et al. (2010).

Weekly body weight gain

There were no significant differences ($P > 0.05$) in body weight gain of three broiler strain at first, second and fourth weeks of age (Table 3). In third weeks the significant differences ($P < 0.01$) observed between Cobb-500 and Arbor Acres. The results were agreed with the findings of Hossain et al (2014). There were also significant differences ($P < 0.01$) between Hubbard Classic and Arbor Acres.

Feed conversion ratio

The data (Table 4) showed that feed conversion ratio of three broiler strains during the first week showed highly significant ($P < 0.001$). The findings were similar with the observation of Cobb-vantress.com (2013). There were no significant differences ($P > 0.05$) observed among the three broiler strains at second weeks of age. The feed conversion ratio were highly significant changes ($P < 0.001$) at third weeks of age in three broiler strains. These findings supported the observations of Hossain et al. (2011) and Sudarman et al. (2011). There were no significant differences ($P > 0.05$) at the fourth weeks among them. The results are agreed with the observations of Sarker et al. (2001) and Azad (1996).

Mortality

There were no significant differences ($P > 0.05$) of mortality among the three broiler strain at first, second, third and fourth weeks of age (Table 5). These findings with the observations of Sarker et al. (2001) but Hossain et al. (2011) reported that there were no significant differences

($P > 0.05$) of mortality in different strains.

Dressing%

The dressing percentage between the Cobb-500 and Arbor Acres broiler strains were highly significant differences ($P < 0.001$) in winter seasons at fourth weeks of age (Table 6). It's were also highly significant ($P < 0.001$) between Hubbard Classic and Arbor Acres. These results were in agreed with Zullitch et al. (1989). These differences were not significant ($P < 0.05$) between the Cobb-500 and Hubbard Classic.

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