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Research Article

Performance Characteristics of three Broiler Strains in Rainy Seasons in Bangladesh

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Abstract

A total of 135 day old broiler chicks were collected from the purchasing outlets of two (02) different breeding hatcheries in Bangladesh. The chicks were placed in an open shed house and were exposed to two different environmental temperature and humidity in rainy season. Chicks as hatched broilers belonging to 3 strains Cobb-500, Hubbard Classic and Arbor Acres, 45 of each strain were reared in rainy season; having 135 with 3 replications 15 broilers per pen. Feed consumption at second and fourth weeks of age were significant differences ($P<0.001$ and $P<0.05$) in Cobb-500, Hubbard Classic and Arbor Acres in rainy season. Body weight at fourth weeks of age were significant differences ($P<0.05$) among the three broiler strain in rainy season. There was no significant differences ($P>0.05$) in feed consumption among the three broiler strain at first and third weeks of age. Body weight was also differed non significant ($P>0.05$) at first, second and third weeks of age. The feed conversion ratio among the three broiler strain at second and third week of age were significant differences ($P<0.05$). There were no significant differences ($P>0.05$) of mortality were observed in three different broiler strain. The dressing percentages were significantly differed ($P<0.05$) in rainy season at the end of fourth weeks of age. It may be concluded that Hubbard Classic may perform the best in rainy season than Cobb-500 and Arbor Acres due to dressing yield. Cobb-500 of the later two strains may also be recommended for commercial boiler production, but priority may be given to the Hubbard Classic in rainy season.

Introduction

Production performance of the broilers depend on their adaptability to the climatic stresses, for example, temperature, humidity and other incidences (diseases) which may put a great impact on the production potentials and survivability of these fast-growing broiler strains. Baghel and Pradhan (1989) noted great influence of environment and reported that body weight gains and feed intake of the broilers were maximum in cold followed by those of hot-humid and hot season. Bohren *et al.*, (1982) showed that fast growing broilers were heat stressed at higher environmental temperatures and therefore were not suitable to rear in the tropic.

Yalcin *et al* (1997) indicated that the depression of broiler performance due to high ambient temperature climate could not be fully compensated by management especially in hot-climate developing countries where limited capital is available to reduce the heat in chicken houses. Amankrah *et al* (1997) on the study found that the marketing of the winter compared to summer flock chickens delayed by one week because at the end of the sixth week when the birds were normally sold out at average weight of 1.5kg, they were found to be underweight for sale. This study contradict with Yalcin *et al* (1997) who reported that there is a lower body weight of broiler in summer

than fall and that effect is substantially greater in body weight from four to seven weeks than from zero to four weeks of age. Hruby *et al* (1996) showed that the growth rate of male broilers is affected more negatively by high environmental temperature than the growth of female broilers. The larger negative effect of high environmental temperature of growth of male broilers than female broilers resulted from higher protein growth of males, as well as broiler's higher sensitivity to restrictive factors of growth introduced during the rearing. Yalcin *et al* (1997) showed that body temperature of the normally fed broilers increased with ambient temperature, i.e., it is higher in summer than in fall. It was hypothesized that the high summer values were due to the high ambient temperature, which reduced the dissipation rate of heat generated when feed is digested and metabolized. Hruby *et al (*1996) suggested that body protein is a more reliable indicator of growth because of variation in water content of the body and the effect of nutrition and environmental temperature on carcass fat content.

Sarker *et al.,* (2001) has reported that body weight gain and feed consumption up to 6 weeks of age were significantly higher in ISA Vedette than in Arbor Acres and Hybro. They have also observed that ISA Vedette may perform the best in winter than in Hybro and Arbor Acres. The latter two strains may also be recommended for commercial broiler production in winter, but priority may be given to ISA Vedette strain. Growth performance as well as profitability of broilers is decreased with the increase of temperature (Harris and Nelson, 1975; Howlider and Rose, 1987).

Several studies indicated that environmental temperature affected on carcass composition and meat yield traits. The female chicken contained more fat, breast meat and skin weight than the male chicken at higher temperature (Howlider and Rose, 1989; Tawfik *et al.,* 1989; Bray, 1983). Hossain *et al.* (2011) reported that the poor performance and reduced feed intake of the broiler strain (MPK) may be affected by the adverse environmental impact. They were also observed that feed conversion ratio (FCR) of the Cobb-500 broiler strain was found to be superior to other strains in this study. Abdullah *et al.* (2010) who found similar FCR value in Hubbard classic strain of broiler during the rearing period from 7-42 days of age.

Materials and Methods

A total of 135 day old broiler chicks were collected from the purchasing outlets of two (02) different breeding hatcheries in Bangladesh. The chicks were placed in an open shed house and were exposed to two different environmental temperature and humidity in rainy season. Chicks as hatched broilers belonging to 3 strains Cobb-500, Hubbard Classic and Arbor Acres, 45 of each strain were reared in rainy season; having 135 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, body weight gain, mortality, FCR, dressing%, composition of meat 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 *ad-libitum* up to 28 days to make a comparison on their production performances but it was measured by electric balance throughout the experimental period to the birds. 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.

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

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

$$\textbf{Performance index (PI \%)} = \frac{\text{Live weight (kg)}}{\text{Feed conversion raitio}} \times 100$$

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

Statistical procedure

The experimental data were analyzed statistically using analysis of variance (ANOVA) technique by a computer 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 Dunkan's New Multiple Range Test (DMRT). The dressing yield parameters were converted to the percentage of their respective body weight for statistical analysis.

Results and Discussion

The performance of different broiler strain

The production performance of different broiler strain was observed at 4^{th} weeks of age in Table1. During those periods Arbor Acres had always higher feed intake and higher production in rainy season than other two strain. But, FCR

values were higher in Hubbard Classic. Among the three broiler strain, the mortality values were similar at the end of 4th weeks of age. Hubbard Classic produced the highest 63.80% of dressing yield but Cobb-500 and Arbor Acres produced dressing yield by 56.63% and 59.56% respectively in rainy seasons.

Averages feed intake at 4th weeks of age were significant (P<0.05) differences between the Cobb-500 and Hubbard Classic broiler strain. It was also significant within the Arbor Acres and Cobb-500.These results were supported by the findings of Sarker *et al.* (2001 & 2002). There were' significant differences (P<0.05) in body weight gain at 4th weeks of age. These results were agreed with the observation of Hossain *et al.* (2014). At the end of 4th weeks of age there were no significant (P>0.05) differences in feed conversion ratio in three broiler strain. The mortality percentages were 4.45 followed by Cobb-500, Hubbard Classic and Arbor Acres. There were no significant differences (P>0.05) in mortality among the three strain. The dressing percentages at 4th weeks of age were significant differences (P<0.05) between the Cobb-500 and Hubbard Classic. The results were closely related with the findings of Azad (1996). It was no significant differences within the Arbor Acres and Cobb-500; Hubbard Classic and Arbor Acres.

Table 1: Performance of different broiler strain in rainy season

Parameter	Age (Weeks)	Strain(Mean ± SEM)			SED	Level of Significant
		Cobb-500	Hubbard class	Arbor Acres		
Ave. Feed intake (g/b)	4th	1737.75±34.37[b]	1879.38±50.71[a]	1938.95±12.89[a]	8.18	*
Ave. body weight (g/b)	4th	1265.89±42.40[b]	1355.60±19.71[ab]	1408.84±20.64[a]	5.99	*
FCR	4th	1.37±.03	1.39±.05	1.38±.03	-	NS
Mortality%	4th	4.45±2.22	4.45±2.22	4.45±2.22	-	NS
Dressing %	4th	56.63±2.31[b]	63.80±0.53[a]	59.56±1.21[ab]	1.26	*

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

Feed Intake

Feed intake of broilers in different weeks is shown in Table2. It is evident that feed consumption of Cobb-500, Hubbard Classic and Arbor Acres was 130.48g, 144.34g and 126.51g per broiler strain, respectively during the first week of age. The highest value of feed intake was 144.34g in Hubbard Classic. In second weeks the highest feed intake 533.79g was observed in Hubbard Classic broiler strain followed by 459.92g and 438.99g in Cobb-500 and Arbor Acres broiler strain, respectively. The third weeks feed intake of Hubbard Classic was 1063.74g and the fourth weeks feed intake of Arbor Acres was 1938.95g. These were the highest value among the three broiler strain. Since first week to third weeks Hubbard Classic was continued the highest feed consumption than other two broiler strain and Arbor Acres was highest in fourth weeks.

Feed intake of broiler strain during the first week, there were no significant differences (P>0.o5) among the three broiler strain. In second weeks of age feed consumption among the strain differed highly significant (P<0.001). These results were supported by Hornia-Kova (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 strain at third weeks of age. The results of third weeks were in accordance with the result of Hossain *et al.* (2011). In fourth weeks there were significant differences (P<0.05) between Cobb-500 and Hubbard Classic broiler strain. It was also significant (P<0.05) between Arbor Acres and Cobb-500.

Table 2: Average feed intake (gm/bird) in rainy season

Week	Strain(Mean ± SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1st	130.48±1.37	144.34±7.75	126.51±3.50	-	NS
2nd	459.92±7.71[b]	533.79±18.09[a]	438.99±10.42[b]	15.03	***
3rd	1034.34±19.62	1063.74±31.65	1008.68±20.23	-	NS
4th	1737.75±34.37[b]	1879.38±50.71[a]	1938.95±12.89[a]	8.18	*

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

Body Weight

The body weight of broiler strain in different weeks of rainy season is shown in Table3. It is cleared that the highest body weight of Arbor Acres was 144.78g in first week of age followed by 136.64g and 134.90g in Cobb-500 and Hubbard Classic broiler strain, respectively. In second week the satisfactory body weight 402.16g was observed in Arbor Acres, 386.83g in Cobb-500 and 373.04g in Hubbard Classic. The third weeks and fourth weeks were also highest body weight 761.93g and 1408.84g in Arbor Acres than the other two broilers strain 744.56g and 1265.89g in Cobb-500; 735.17g and 1355.60g in Hubbard Classic.

The weekly body weight of different broiler strains were presented in Table3. In first week, there were no significant differences (P>0.05) found among the three broiler strain. There were also no significant differences (P>0.05) at second and third weeks of age in three different broilers. This result was similar with the observation of Makram *et al.* (2010). The significant differences (P<0.05) between Cobb-500 and Arbor Acres were observed at fourth weeks age. This significant differences (P<0.05) were also observed between Hubbard Classic and Arbor Acres. These findings were supported by Hossain *et al.* (2011&2014), Sarker *et al.* (2001&202).

Table 3: Average body weight gain (gm/bird) in rainy season

Week	Strain(Mean ± SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1st	136.64±5.07	134.90±2.49	144.78±11.28	-	NS
2nd	386.83±10.31	373.04±30.99	402.16±21.98	-	NS
3rd	744.56±8.18	735.17±37.93	761.93±33.27	-	NS
4th	1265.89±42.40^{b}	1355.60±19.71^{ab}	1408.84±20.64^{a}	5.99	*

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

Feed Conversion Ratio (FCR)

Feed conversion ratio of three broiler strain in rainy season was presented the Table4. The FCR value of Cobb-500, Hubbard Classic and Arbor Acres was 0.96, 1.07 and 0.88 at first week of age, respectively. In second week, the highest FCR value was 1.44 in Hubbard Classic and lowest 1.10 in Arbor Acres. At the end third week of age FCR 1.39, 1.45 and 1.33 were found in Cobb-500, Hubbard Classic and Arbor Acres, respectively. The lowest FCR value at fourth weeks of age was 1.37 in Cobb-500, highest 1.39 in Hubbard Classic and 1.38 in Arbor Acres.

Data presented in Table4 showed that feed conversion ratio of three broiler strain during the first week were no significant differences (P<0.05). The significant differences (P<0.05) were observed between Hubbard Classic and Arbor Acres at second weeks of age. This significant differences (P<0.05) were also observed between Hubbard Classic and Cobb-500. These results were supported with the findings of Islam *et al.* (2008). The feed conversion ratio significantly (P<0.05) affected at third weeks of age between Hubbard Classic and Arbor Acres. These observations were supported with the results of Hossain *et al.* (2011) and Sudarman *et al.* (2011). There were no significant differences (P>0.05) in fourth weeks among the three broiler strains. The results are agreed with the findings of Sarker *et al.* (2001) and Azad (1996).

Table4: FCR in rainy season of three broiler strain

Week	Strain(Mean ± SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1st	0.96±.03	1.07±.08	0.88±.06	-	NS
2nd	1.19±.05^{b}	1.44±.08^{a}	1.10±.04^{b}	9.23	*
3rd	1.39±.03^{ab}	1.45±.03^{a}	1.33±.03^{b}	3.9	*
4th	1.37±.03	1.39±.05	1.38±.03	-	NS

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

Mortality%

The mortality percentages of three strains in rainy season were shown in Table5. It was evident that there were no mortality percentages in Cobb-500 at first week of age. In second weeks the mortality percentages were 4.45 in Cobb-500, Hubbard Classic and Arbor Acres. This mortality values was fixed in three broiler strain at third and fourth weeks of age.

The mortality values were found in Hubbard Classic and Arbor Acres at first week of age. There were no significant differences (P>0.05) of mortality among the three broiler strain at first, second, third and fourth weeks of age. These findings were similar with the observations of Sarker *et al.* (2001). Hossain *et al.* (2011) reported that there were no significant differences (P>0.05) of mortality in different strain.

Table5: Mortality % of three broiler strain in rainy season

Week	Strain(Mean ± SEM)			SED	Level of Significance
	Cobb-500	Hubbard Classic	Arbor Acres		
1st	0	2.22±2.22	2.22±2.22	-	NS
2nd	4.45±2.22	4.45±2.22	4.45±2.22	-	NS
3rd	4.45±2.22	4.45±2.22	4.45±2.22	-	NS
4th	4.45±2.22	4.45±2.22	4.45±2.22	-	NS

*= Significant (P<0.05); NS= Non- Significant (P>0.05)

Dressing%

The dressing percentages of three broiler strains in rainy season were shown in Table6. It was evident that the dressing percentage value was 63.63 in Hubbard Classic. It was the highest values than other two broiler strain followed by 56.63 in Cobb-500 and 59.56 in Arbor Acres at fourth weeks of age.

The dressing percentage between the Cobb-500 and Hubbard Classic broiler strains were significant differences (P<0.05) in rainy seasons at fourth weeks of age. This was also supported by Zullitch *et al.* (1989). These differences were no significant (P<0.05) between the Cobb-500 and Arbor Acres. There were also differed no significant (P>0.05) between the Hubbard Classic and Arbor Acres. This result was advocated with Rahman (1990) who found the non-significant differences for dressing yield among the different broiler strain.

Table 6: Dressing % of three broiler strains in rainy season

Strain	Dressing %	SED	Level of Significance
Cobb-500	56.63±2.31[b]	1.26	*
Hubbard Classic	63.80±0.53[a]		
Arbor Acres	59.56±1.21[ab]		

Mean±SEM in the same column with different superscripts differed significantly, but similar superscripts did not differ significantly. Level of significant=*; SED=1.26; *= Significant (P<0.05).

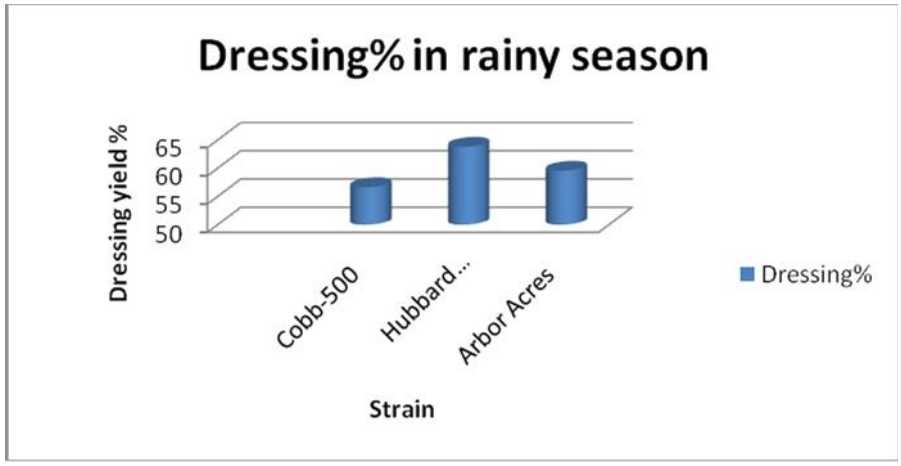

Figure1: Dressing percentages of three broiler strains in rainy season

Environmental temperature and humidity

The environmental temperature and humidity in different weeks were shown in Figure2. The highest environmental temperature in rainy season was 29.3 °C at fourth weeks during experimental period. In rainy season the highest relative humidity were 84.8% at the same week.

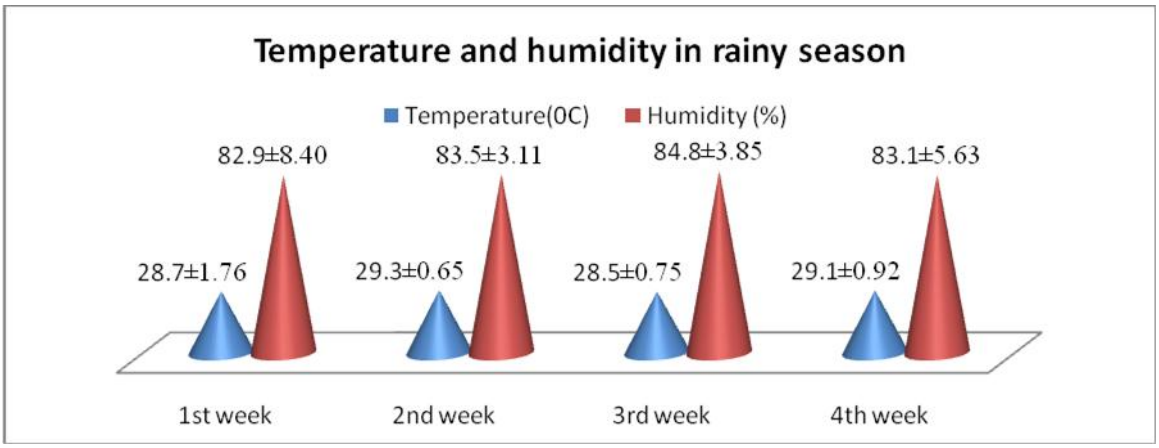

Figure2: Environmental temperature and humidity in summer season

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