IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 14, Issue 7 Ser. II (July 2021), PP 01-04
www.iosrjournals.org

Effect of house feed on weight change of commercial broilers harvested at different marketing ages in Bangladesh

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Abstract
This study investigated the effect of house feed on birds' performances at different market age. A 6-day trial with two house feeds (AIT and Paragon) and a standard broiler diet were conducted to know the weight gain, feed consumption and survivability of birds harvested at 28-day and 35-day age. A total of 270 birds were divided into three dietary treatments having three replicate with 15 birds each. The experiments repeated during two different seasons. Ad libitum feed and water and standard management practices were provided. Results indicate that lowered CP contents of house feeds markedly influenced weight gain of broilers. Birds on standard broiler diet gained on an average of 499g compared to those of two house feeds of 127 and 194g and these massive gap was due to feed formulation of the diets. Harvesting age influenced a lot; heavier birds harvested on 35-day achieved higher ($p>0.01$) gain than those of 28-day (363 vs 184g) by consuming higher amount of feed. Again season had no significant influence on weight gain, though differences in body weights were large throughout the study period. Feed consumptions did not follow the trend similar daily body weight. In most of the cases, feed consumption slightly decreased with the advancement of age. Birds consumed the lowest amount of house feed, Paragon throughout the study period. Broilers consumed AIT house feed at an increasing trend, but yielded lowest gain. Variable results were found in seasonal influence on birds' feed consumption. Survivability was not affected either by feed type, harvesting age, rearing season or their interactions. Substantial variations in body weight, weight gain and feed consumption were interacted to produce significant results.

Keywords: *House feed, performances, location, harvesting age, season*

Date of Submission: 06-07-2021 Date of Acceptance: 19-07-2021

I. Introduction

House feed (also called market feed) is a low protein diet used to feed broilers in the wet market. Some feed manufacturers in Bangladesh are producing this sort of feed offering comparatively lower price only for the sustenance of live birds specially broilers before slaughter/or live disposal at wet market. This feed is relatively popular among the retailers in wet market due to lower price. But, instead of using balanced diet it might cause loss of body weight. Growth performance and carcass composition become inferior to those of broiler chicks fed standard high-CP diets when dietary CP content is lowered by more than three to four percentage points (Ferguson *et al*., 1998; Aletor *et al*., 2000). Thus, it is generally not recommended to lower the dietary CP content by more than about three percentage points (Kornegay and Verstegen, 2001; Lewis, 2001). In Bangladesh, live bird marketing is a popular practice at wet shop. Sometimes, retailers have to retain live broilers for 2-3 days in the shops with these sorts of house feeds. Some of the retailers use standard broiler diet also. Thus state of weight change of broilers in the wet shops fed different diets is needed to be investigated. The objective of the experiment reported herein was to explore the effects of using house feed on performances of broilers at market age before sacrifice.

II. Materials and Methods

Diet, bird and management

Two house feed samples were collected form the market and were analysed in an accredited laboratory (SGS India Ltd.). Along with these two, a standard broiler diet was also included to compare the performances. Birds' performances were measured at two harvesting ages i.e. at 28-day and 35-day of age. A total of 270 birds were allocated to three dietary treatment groups having three replications each with 15 birds. The study was replicated at two different geographical locations (Northern and Southern area) and in three different seasons (summer, rainy and winter) of a year. *Ad libitum* feed and clean drinking water was supplied to all the birds throughout the trial period. Standard management was provided for all the birds for a period of 6 days.

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Data recording and analysis

Daily body weight, feed consumption and mortality were recorded. Weight change, feed consumption and survivability were calculated. All recorded and calculated data were subjected to ANOVA in a 3 (feed)×2(harvesting age)×3(rearing seasons) factorial design in CRD using GENSTAT Package (Lawes Agricultural Trust, 1997).

III. Results

Composition of experimental diets

Table 1 indicate that CP% was much lower (10.54 and 12.22) than standard broiler diet (17.5). But, house feed contained higher Ca% (1.35 and 2.51) than standard finisher diet (0.76). It was also found that nutrient content specially CP% was also lower than the value labeled on the bag.

Table 1 Chemical composition of house feed and commercial broiler diet

Nutrient components	Sample 1 (HFPA)	Sample 2 (HFAIT)	Sample 3 (Standard diet)
CP %	10.54 (minimum 15±1)	12.22 (minimum 13±1)	17.50
Ca%	1.35 (minimum 1.20)	2.51 (minimum 1.00)	0.76
P%	0.51 (minimum 0.45)	1.06 (minimum 0.60)	0.67*

Figures in the parentheses indicate labeled composition on the bags; *, available P

Body weight and weight gain

Body weight day^{-1} and weight gain irrespective of harvesting age and rearing season were significantly different among the treatment groups except initial weight of birds (Tables 2). Birds on different house feeds gained almost similar weight throughout the study period though it was much lower ($p>0.01$) than that of standard broiler diet. Weight gained by the birds fed AIT and Paragon house feeds after 6-day trial period were 127 and 194g bird^{-1}, respectively and it was statistically similar. On the contrary, broiler fed standard broiler diet gained 499g bird^{-1} over the same period and it was significantly higher than those of two house feeds. Harvesting age had also profound influence ($p>0.01$) on daily body weight and as well as weight gain (Table 2). Birds harvested on 35-day was usually heavier than those on 28-day (2480 vs 1665g) which are treated as initial body weights. This difference in body weight became wider with the advancement of age. Thus, weight gain also displayed a huge difference (363 vs 184g bird^{-1}). Birds during summer were lighter ($p>0.01$) than rainy season throughout the study period (Table 2). But, average weight gains in two seasons were almost comparable (297 vs 150g bird^{-1}) at the end of trial period.

Table 2 Weight changes (g bird^{-1}) and survivability (%) of birds according to feed, age and season

Parameters	Feed type				Harvesting age			Rearing season		
	AIT	Paragon	Standard diet	SED/LSD	28-day	35-day	SED/LSD	Summer	Rainy	SED/LSD
Initial weight	2105.0	2043.0	2069.0	34.00^{NS}	1665.0	2480.0	79.80**	1979.0	2166.0	79.8**
D1 weight	2165.0	2082.0	2192.0	108.60**	1699.0	2593.0	88.70**	2057.0	2236.0	88.7**
D2 weight	2188.0	2132.0	2272.0	114.10**	1728.0	2666.0	32.90**	2105.0	2289.0	93.2**
D3 weight	2209.0	2182.0	2342.0	130.90**	1773.0	2715.0	106.90**	2153.0	2336.0	106.9**
D4 weight	2213.0	2199.0	2385.0	140.00**	1786.0	2745.0	114.30**	2193.0	2338.0	114.3**
D5 weight	2231.0	2225.0	2494.0	143.60**	1827.0	2806.0	117.20**	2242.0	2391.0	117.2**
D6 weight	2232.0	2238.0	2569.0	159.60**	1849.0	2843.0	130.30**	2276.0	2416.0	130.3**
Weight gain	127.0	194.0	499.0	99.30**	184.0	363.0	81.10**	297.0	250.0	28.60^{NS}
Survivability	100.0	98.81	96.37	1.91^{NS}	99.2	97.6	1.56^{NS}	98.41	98.37	1.56 ^{NS}

D, day; NS, Not significant; **, $p>0.01$

Feed consumption

Unlike weight, daily feed intake was affected by feed type (Table 3). With the advancement of age, feed consumption slightly decreased except AIT. Birds reared on Paragon house feed consumed the lowest and this consumption pattern was retained all through. Moreover, they ate less amount of feed on 2rd day onward. Birds reared on standard diet did not cross the initial intake level except 2nd day. Heavier birds consumed more ($p<0.01$) feed and this trend was observed up to the end (Table 3). Bird's feed intake slightly reduced after 2nd day onwards, though it was recovered to some extent at the end. Similar feed consumption patterns were also found in seasonal performances (Table 3). However, feed intake on day-1 was almost same at the end in case of birds harvested on 28-day and also birds reared in summer.

Table 3 Feed consumption (g bird^{-1}) according to feed type, age and season

Parameters	Feed				Age			Season		
	AIT	Paragon	Standard diet	SED/LSD	28 days	35 days	SED/LSD	Summer	Rainy	SED/LSD
D1	158.1	148.8	155.7	5.13^{NS}	120.50	188.0	11.85**	150.3	158.1	4.18^{NS}
D2	163.1	158.0	171.5	8.39^{NS}	132.70	195.7	19.39**	165.9	162.5	6.85^{NS}
D3	157.1	145.3	154.2	9.48^{NS}	122.60	181.8	21.91**	154.7	149.7	7.74^{NS}
D4	152.2	147.9	147.1	10.32^{NS}	125.60	172.6	23.85**	162.3	135.9	23.85**
D5	165.8	134.5	150.2	28.51*	126.60	173.8	31.00**	161.5	138.9	23.28*
D6	162.6	133.0	150.7	28.30*	120.80	176.8	31.46**	150.5	147.0	11.11^{NS}

D, day; NS, Not significant; **, p>0.01, *, p>0.05

Survivability

Survivability was almost similar in all the cases (Tables 2 and 3). Results indicate that irrespective of feed, harvesting age and rearing season survivability of birds ranged from 96.37-100 percent.

Interactions

All interactions were significant (p>0.01) except survivability (Table 4). Bird's body weight and feed consumption on day-1 and day-6 yielded significant interaction effects. Interaction results demonstrated that broilers on standard broiler diet harvested at 35-day gained the highest weight during rainy season. Similar survival rates interacted to produce insignificant results.

Table 4 Interactions of house feed (HF), harvesting age (HA) and rearing season (SE) on broiler performances

Interaction	Body weight (g b^{-1})		Feed intake (g b^{-1})		Survivability (%)
	Initial	6-day	Day-1	Day-6	
$HF_1 \times HA_1 \times SE_1$	1717.00	1785.00	129.50	161.50	100.00
$HF_1 \times HA_1 \times SE_2$	1703.00	1845.00	132.50	128.50	100.00
$HF_1 \times HA_2 \times SE_1$	2359.00	2467.00	188.00	171.90	100.00
$HF_1 \times HA_2 \times SE_2$	2643.00	2831.00	182.30	188.70	100.00
$HF_2 \times HA_1 \times SE_1$	1575.00	1758.00	107.40	103.60	100.00
$HF_2 \times HA_1 \times SE_2$	1695.00	1785.00	126.70	117.10	100.00
$HF_2 \times HA_2 \times SE_1$	2293.00	2582.00	189.30	154.10	95.24
$HF_2 \times HA_2 \times SE_2$	2610.00	2826.00	171.80	157.10	100.00
$HF_3 \times HA_1 \times SE_1$	1598.00	2004.00	80.80	101.30	100.00
$HF_3 \times HA_1 \times SE_2$	1705.00	1920.00	145.90	112.50	95.00
$HF_3 \times HA_2 \times SE_1$	2333.00	3062.00	207.00	210.60	95.24
$HF_3 \times HA_2 \times SE_2$	2640.00	3288.00	189.30	178.20	95.24
SED/LSD	195.600	319.300	29.020	77.060	3.814
Level of significance	**	**	**	**	NS

HF_3, Standard broiler diet; **, p>0.01

IV. Discussion and conclusion

Comparing analytical results with those of labeled composition it can be concluded that manufacturers are providing exaggerated misleading information. So, retailers become looser. Moreover, excessive mineral and lower CP contents indicate no or very weak control or monitoring of regulatory authority over feed manufacturing process. Findings reveal that standard broiler diet's performances were the best regarding weight gain. Nutritionally balanced broiler diet attributed to these differences in weight gain among the treatment groups. Previous study found an increased protein level associated with increased weight gain of broilers (Jackson *et al.* 1982). Higher initial weight contributed to heavier weight in birds harvested on 35-day. This result was supported by Coban *et al*. (2014) who found increased body weight up to 49 days and thereafter weight gain became decreased compared to feed intake. Broiler's weight is increased up to certain periods and after that profitability decreases with extended growth periods (Baéza *et al.*, 2012). In broiler chicken production, in general, the extension of the growth period affects the weight gain. Heavier birds consumed more feed and gained more weight. Relatively higher gain may simply be a function of more feed consumption. However, higher initial weight during rainy season affects daily weight gain all through. Although performances of broilers are the resultant factors of the genetic constituent, management, and feed formulation, environmental concerns associated with the concentrated production of broilers remain a priority issue today in which they are reared (College of Agriculture and Natural Resources Bulletin 2006).

Feed consumption trend found in AIT feed is the usual phenomenon. The lowering trend in feed consumption found in Paragon and broiler feeds are difficult to explain. Birds' physiological state, gut environment might be possible reasons. More nutrient requirements of heavier birds were the factor for higher

feed intake found in this study. Feed intake of birds depends on a number of factors and complex mechanism (Ferket and Gemat, 2006). We found types of feed, age of birds and season were associated with feed intake of birds. Increased ($p>0.05$) feed consumption yielded relatively higher weight during summer. Lowered feed intake during rainy season can be explained by physiological conditions of birds. We found birds reared during summer were lighter ($p>0.01$) than rainy season ones which was in line of result of Sarma *et al*. (2020). Broilers exhibits optimal feed intake and weight gain when reared within the comfortable zone. Ferket and Gernat (2006) reported that environmental stresses had the most profound effects on flock-to-flock variation in feed intake that influenced both the body weight gain and feed conversion in meat-type poultry.

There were no differences in survivability depending on feed, age and season. Vaccinated birds and applying standard management practices helped to exhibit no major issues affecting bird health. Variable results ($p>0.01$) in body weight and feed consumption were interacted to yield significant results.

Acknowledgement

This study was conducted under the project entitled 'value addition and standardization of nutritional level in selected food items from animal and plant origin' funded by NATP-BARC, Dhaka, Bangladesh.

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Fouzder SK, et. al. "Effect of house feed on weight change of commercial broilers at different marketing ages in Bangladesh." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 14(7), 2021, pp. 01-04.