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DIFFERENT LEVELS OF PROTEIN ON THE PERFORMANCE OF SYNTHETIC BROILER

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ABSTRACT

An experiment was conducted with fifty four, 21 days old synthetic broiler (fifth generation) to study the effect of different levels of dietary protein on the performance of broiler during growing and finisher period. Three levels of protein i.e. T_1 (18% CP), T_2 (19% CP) and T_3 (20%CP) were considered as the dietary treatments. The body weight achieved at 42 days of age was 1422.00, 1705.37 and 1563.67 gm in T_1, T_2 and T_3, respectively which differs significantly ($p< 0.01$). The live weight gain at 42 days was also highest in T_2 (19% CP) diet and significantly ($p< 0.05$) differed from T_1 (18% CP) and T_3 (20% CP) diets. Feed conversion ratios at the end of experimental period were 2.20, 1.75 and 1.87 in T_1, T_2 and T_3, respectively which differs significantly ($p<0.05$). The performance index at 42 days of age was 50.66, 82.67 and 63.58 for T_1, T_2 and T_3 respectively while feed consumption, livability and meat yield were not significantly ($p>0.05$) affected by dietary treatments. The net profit per kg live broiler was significantly highest (Tk.14.09/kg) ($p<0.01$) in T_2 diet as compared to other treatments. It may be concluded that 19% crude protein diet, was the best with respect to growth, FCR and net profit for synthetic broiler (fifth generation) during growing and finisher period.

Key words: Protein, performance, broiler

INTRODUCTION

Feed cost is the major cost of broiler production. It's allocated about 65-70% of the total cost. Among the dietary composition, protein cost is about 15% of total feed cost (Singh, 1990 and Banerjee, 1992). The cost of feed ingredients is increasing day-by-day. So the broiler should be fed the diet that give maximum growth performance with minimum cost. Broiler consumed major amount of feed during growing and finisher stages. Feeding optimum nutrient level would minimize the feed cost, reduce environmental pollution, maximize the growth and F.C.E. and economize the broiler production.

Optimum level of dietary protein and energy level is very essential for broiler production. It is reported that increasing dietary crude protein (CP) with optimum essential amino acids reduced feed intake. Diet containing less than 18.12% protein decreased weight gain in grower and total period up to 4.6 and 5.6% respectively, (Rezaei *et al.* 2004). Silva *et al*. (2001) have described the calorie-protein ratio as the important factor for broiler production that of 148 at a level of 3100 kcal ME met the broilers requirements for optimum growth from 22 to 42 days of age. Bangladesh Standards and Testing Institution (B.S.T.I, 2005) suggested 19-21% and 18-20% crude protein is required for broiler during growing and finisher period. Broiler fed the diet containing 3200 kcal ME/kg diet had higher weight gain, better feed conversion and higher abdominal fat deposition than the diet containing 2900 kcal ME/kg diet (Maiorka *et al.* 2004). The present experiment was undertaken to assess the feed consumption, feed conversion ratio and growth of synthetic broiler fed different level of protein during growing and finishing period (4-6 weeks) and to estimate economic benefit.

MATERIALS AND METHODS

Fifty-four males and females chicks, age 21 days, were randomly distributed to three dietary treatments having three replications in each treatment. The house and all equipments (feeders, waters) were cleaned, washed and disinfected properly (by vircon S). After proper drying the room was partitioned to 9 separate pens of equal size by bamboo, wood and wire net. Then rice husk was spread on the floor of each pen as a liter material at a depth of 6 cm**.**

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Three experimental grower and finisher diets were prepared with three levels of crude protein, ME and calorie protein ratio. The composition of the experimental diets is shown in Table 1. The diets were prepared with locally available feed ingredients. The feed ingredients were hand mixed thoroughly. Vitamin-mineral premix was first mixed with a small quantity of mixed feed and which was then gradual mixed with remaining amount of feed. Finally, total amount of feed was mixed thoroughly. Ration for seven days was prepared at a time.

The experimental diets were fed from 22 to 42 days. Initially feed was supplied four times daily i.e. once in the morning, at noon, afternoon and again at night in such a way those feeders were not empty without any wastage of feed. Fresh and clean drinking water was available all the times. The birds were exposed to 23 hours of lighting and a dark period of 1 hour per day throughout the experimental period.

Vaccination and medication schedule was followed regularly. Megavit WS® was supplied to prevent vitamin deficiency disease @ 1 g per 7 liter of water for three days at 22-24 days of age.

Feed consumption, body weight gain and mortality were recorded, and feed conversion ratio calculated. Dressed weight, giblet weight and abdominal fat weight of the dressed birds were recorded.

Economic assessment was based on current feed cost and price of meat (June-July, 2007). The experiment was conducted following the Completely Randomize Design (CRD). Analysis of variance (ANOVA) for experimental data was computed to determine the treatment effects using MSTAT program.

Table 1. Composition of the experimental diets

Ingredients (kg)		**Treatment**		
		T_1	**T_2**	**T_3**
Maize		59.75	59.75	60
Soybean meal		13.75	18.25	22
Rice polish		16.5	9.75	5.5
Protein concentrate (Jasoprot(R))		8.5	8.25	8.0
Soybean oil		0	2.5	3
Limestone		1.25	1.25	1.25
Common salt		0.25	0.25	0.25
Vitamin-mineral-premix		Trace	trace	trace
Nutrient Composition				
ME	kcal/kg	3100 (3099)	3200 (3207)	3200 (3205)
CP	(%)	18 (17.97)	19 (18.97)	20
Cal.: Protein ratio	(kcal/ %)	172	169	160
CF	(%)	3.31	3.32	3.40
EE	(%)	5.05	6.81	6.86
Ca	(%)	0.98	0.97	0.97
Av. P	(%)	0.35	0.34	0.33
Arginine	(%)	0.99	1.04	1.10
Lysine	%()	0.90	0.95	1.00
Methionine	(%)	0.34	0.36	0.38
Methionine+cystine	(%)	0.65	0.68	0.72
Threonine	(%)	0.66	0.70	0.74
Tryptophan	(%)	0.16	0.17	0.18
Cost/kg Feed	(Tk)	16.69	18.64	19.28

RESULTS AND DISCUSSION

Live weight

Life weight is presented in table 2.The initial live weight at 21 day in different dietary treatments; T_1, T_2 and T_3 were 422.33g, 419.67g and 416.67g respectively and the difference was non-significant. At the 28 and 35 days of age, the body weight attained in T_2 and T_3 was significantly higher than T_1. But at 42 days of age, T_2 was significantly higher ($P<0.01$) than T_1 and T_3. It' indicates that medium level of protein (19%) is good enough for maximum body weight. The results are similar with the observation of Costa *et al*. (2001), Solangi *et al.* (2003), Rezaei *et al.* (2004) and Haq-Nawaz *et al.* (2006).

Table 2. Weekly body weight of broilers in different dietary treatments during growing and finishing period (g/bird)

Age (days)	Body weight (Mean±SE) g/bird			LSD value	Level of significance
	T1	**T2**	**T3**		
21th	422.33±2.66	419.67±2.66	419.67±2.66	5.89	NS
28th	714.00^{b} ±7.37	747.33^{a} ±10.17	744.33^{a}±7.31	18.56	*
35th	1011.00^{b}±14.74	1183.00^{a}±19.05	1161.00^{a}±16.74	36.07	**
42th	1422.00^{b}±11.00	1705.67^{a}±29.42	1563.67^{b}±34.74	59.81	**

T_1 = CP, 18%; ME, 3100 kcal/kg; Cal.: Protein ratio, 172
T_2 = CP, 19%; ME, 3200 kcal/kg; Cal.: Protein ratio, 169
T_3 = CP, 20%; ME, 3200 kcal/kg; Cal.: Protein ratio, 160
Figures in the row with similar alphabet do not differ significantly
** Highly significant ($p<0.01$), *significant ($p<0.05$); NS= non-significant

Live weight gain

The mean live weight gain is presented in table 3. It is evident that live weight gain of birds in T_2 and T_3 was significantly higher than T_1 during 28 and 35 days of age ($p<0.01$). During 42 days of age the live weight gain in T_2 was significantly higher than T_1 and T_3 ($p<0.01$). During the whole experimental period, the highest body weight gain was in T_2. The results agreed with the observation of Costa *et al*. (2001).

Table 3. Body weight gain of broilers in different treatments during growing and finisher period (g/bird)

Age (days)	**Body weight gain (Mean ± SE) g/bird)**			**LSD values**	**Level of significance**
	T1 (18% CP)	**T2 (19% CP)**	**T3 (20% CP)**		
28th	291.67^{b}±4.91	327.67^{a}±7.62	324.67^{a}±4.91	13.17	**
35th	297.00^{b}±21.70	435.67^{a}±19.16	416.67^{a}±8.33	38.48	**
42th	411.00^{b}±24.09	522.67^{a}±29.42	402.67^{b}±24.83	58.00	*
28-42	999.67^{c}±8.33	1286.00^{a}±31.95	1144.00^{b}±32.08	58.80	**
0-42	1380.00^{b}±11.00	1663.67^{a}±29.42	1521.67^{b}±34.74	59.81	**

Figures in the row with similar alphabet do not differ significantly
** Highly significant ($p<0.01$), *significant ($p<0.05$)

Feed consumption

Feed consumption of synthetic birds during different stages of growth and whole experimental period reduced with higher level of protein but the difference was non-significant ($p>0.05$). The results agreed well with the observation of Rahman (2001). Feed consumption of broiler is presented in Table 4.

Table 4. Feed consumption of broilers in different dietary treatments during growing and finisher period (g/bird)

Age(days)	**Feed consumption (Mean ± SE) g/bird**			**LSD values**	**Level of significance**
	T_1 (18% CP)	**T_2 (19% CP)**	**T_3 (20% CP)**		
0-21	506.00±0.00	506.00±0.00	506.00±0.00	0.00	NS
22-28	662.33±36.02	605.67±11.33	585.33±32.38	54.99	NS
29-35	720.67±49.17	728.00±20.10	766.00±25.42	75.22	NS
36-42	1157.00±78.05	1080.33±50.15	991.67±45.72	132.11	NS
29-42	2538.33±52.60	2414.00±53.11	2342.00±103.13	162.68	NS
0-42	3044.33±52.60	2920.00±53.11	2849.00±103.13	162.68	NS

NS= non-significant

Feed conversion ratio (FCR)

At 4th week FCR was significantly better in T_2 and T_3 than T_1. This indicated that at of 4th week 19-20% CP diet is good enough for optimum FCR. At 5th and 6th week the FCR was significantly better in T_2 (19% CP) than T_3 (20% CP) and T_1 (18% CP). These indicated that for synthetic broiler 19% CP diet was good enough for optimum FCR during growing and finisher period. The results were agreed with the reports of Costa *et al.* (2001), Nworgu *et al.* (2001) and Solangi *et al.* (2003). Feed conversion ratio is presented in Table 5.

Table 5. Feed conversion ratios in different dietary treatments during growing and finisher period

Age (weeks)	Feed conversion ratio (Mean ± SE) g feed/g gain			LSD value	Level of significance
	T_1 (18% CP)	T_2 (19% CP)	T_3 (20% CP)		
0-3	1.33±0.00	1.33±0.00	1.33±0.00	0.00	NS
4th	2.28^{a}±0.05	1.85^{b}±0.05	1.80^{b}±0.08	0.14	**
5th	2.43^{a}±0.01	1.67^{c}±0.03	1.84^{b}±0.04	0.07	**
6th	2.81^{a}±0.03	2.07^{c}±0.06	2.46^{b}±0.06	0.12	**
4-6	2.53^{a}±0.03	1.87^{c}±0.01	2.04^{b}±0.03	0.06	*
0-6	2.20^{a}±0.02	1.75^{c}±0.00	1.87^{b}±0.02	0.04	**

Figures in the row with similar alphabet do not differ significantly
** Highly significant ($p<0.01$), *significant ($p<0.05$); NS= non-significant

Edible meat yield and carcass composition

Edible meat yield and carcass composition are presented in Table 6. The dressing percentage, giblet weight did not differ significantly ($p>0.05$) among dietary treatments in male, female and mixed sex. The results are consistent with the observation of Soliman *et al.* (1999). The abdominal fat of male and mixed sex was almost similar in all dietary treatments and the difference was non-significant ($p>0.05$) but in female significantly ($p<0.01$) higher level of abdominal fat was found in T_3 followed by T_2 and T_1. The results are consistent with the observation of Costa *et al.* (2001).

Table 6. Meat yield of broilers at 42 days in different dietary treatments

Variables	Sex	Dietary treatment groups			LSD value	Level of significance
		T_1 (18% CP)	T_2 (19% CP)	T_3 (20% CP)		
Dressing (%)	Male	72.71±1.58	74.07±1.67	74.71±1.22	3.35	NS
	Female	73.72±1.84	75.15±1.34	75.82±1.02	3.20	NS
	Mixed	73.21±1.22	74.61±1.45	75.26±1.11	2.82	NS
Giblet weight (%)	Male	4.50±0.28	4.45±0.16	4.82±0.02	0.43	NS
	Female	4.56±0.14	4.65±0.06	4.84±0.25	0.38	NS
	Mixed	4.53±0.21	4.48±0.12	4.82±0.12	0.35	NS
Abdominal fat weight (%)	Male	1.93±0.10	1.75±0.20	1.27±0.15	0.35	NS
	Female	1.49^{c}±0.16	2.31^{b}±0.16	2.85^{a}±0.26	0.45	**
	Mixed	1.71±0.09	2.03±0.17	2.06±0.16	0.33	NS

Values indicate Mean ± SE
Figures in the row similar alphabet do not differ significantly
** Highly significant ($p<0.01$); NS= non-significant

Cost of production and profit margin

Cost of production and profit margin is presented in Table 7. The production cost per kg live broiler was significantly ($p<0.05$) lowest in T_2 (Tk.60.90) followed by T_3 (Tk.66.53) and T_1 (Tk. 71.18). The profit per live broiler and per kg live broiler was significantly ($p<0.01$) highest in T_2 (Tk. 24.05 and Tk. 14.09) followed by T_3 (Tk. 13.24 and 8.47) and T_1 (Tk. 5.43 and 3.81). The net profit per treatment was also significantly ($p<0.05$) highest in T_2 (Tk. 432.76) followed by T_3 (Tk. 238.23) and T_1 (Tk. 97.65).

Table 7 Production cost and profit margin of live synthetic broiler in different dietary treatments at 6 weeks of age:

Cost items	Treatments (T)			LSD value	Level of significance
	T_1 (18% CP)	T_2 (19% CP)	T_3 (20% CP)		
Chick cost (Tk/ broiler)	25	25	25	0.00	NS
Total feed consumed (kg/broiler)[a]	3.04	2.92	2.85	0.74	NS
Feed cost (Tk/ broiler)				2.56	NS
a. Starter	11.13	11.13	11.13		
b. Grower and finisher	42.36	44.99	45.17		
c. Total	53.49	56.12	56.30		
Litter cost (Tk/ broiler)	5	5	5	0.00	NS
Labour cost (Tk/ broiler)	10	10	10	0.00	NS
Vaccination and medication cost (Tk/ broiler)	6	6	6	0.00	NS
Miscellaneous cost (Tk/ broiler)	1.75	1.75	1.75	0.00	NS
Total production cost (Tk/ broiler)	101.24	103.87	104.05	2.75	NS
Live weight at 42 days (g/broiler)	1422.22[c]	1705.55[a]	1563.88[b]	2.55	**
Production cost per kg live broiler (TK/Kg)	71.18[a]	60.90[c]	66.53[b]	2.31	**
Sale price (Tk/ kg live broiler)	75	75	75	0.00	NS
Profit per broiler(Tk/bird)	5.43[c]	24.05[a]	13.24[b]	1.93	**
Profit (Tk/ kg live broiler)	3.81[c]	14.09[a]	8.47[b]	1.93	**
Total cost (Tk/Treatment)	1822.32[c]	1869.66[b]	1872.90[a]	2.55	**
Total sale (Tk/Treatment)	1919.97[c]	2302.43[a]	2111.13[b]	2.55	**
Net profit (Tk/Treatment)	97.65[c]	432.76[a]	238.23[b]	1.80	**

a = feed consumption during starter (506g) + growing and finisher (T_1 = 2538.33g, T_2 = 2414.00g and T_3= 2343.00g).
Miscellaneous costs include cost of disinfectant, electricity etc.
Figures in the row with similar alphabet do not differ significantly
** Highly significant ($p<0.01$)
NS= non-significant; Cost per kg commercial broiler starter feed was Tk.22/kg

It is concluded that for maximum growth, good FCR and best performance, synthetic broilers need 19% CP during growing and finisher period. However, the production cost per kg broiler was lowest with 19% CP (T_2) diet with maximum profit.

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