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INFLUENCE OF REDUCING BIS RECOMMENDED DIETARY PROTEIN LEVELS ON GROWTH PERFORMANCE, CARCASS CHARACTERISTICS AND PRODUCTION ECONOMICS OF BROILER*

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ABSTRACT

A feeding trial was conducted to reduce to the feeding cost without affecting the growth performance of broiler. At three weeks age, 80 chicks were assigned to two dietary protein treatments namely T_B (control) and T_P (phase fed), each comprising 2 replicates of 20 chicks. Chicks in T_B (control) were fed as per BIS (1992) specifications, while chicks in T_P from 3 weeks onward were offered a series of diets with decreasing protein levels at weekly interval to the end of experimentation. Results indicated that reducing dietary protein with advancement of age improved economics of broiler production without affecting growth performance.

Key words : Broiler, BIS feeding, Phase feeding, Growth performance, Economics

Broiler is the most efficient converter of low value feed in high quality food in the shortest period. A balanced protein and energy in the poultry feed increases the profitability of the poultry industry. The protein and energy supplied to the birds over and above their metabolic needs not wholly utilized but excreted as nitrogen and stored as abdominal fat, respectively.

Phase feeding, based on the concept of "Illinois Ideal Chick Protein" hypothesized that protein and amino acid requirement of broiler reduces with advancement of age[6].

Therefore, reducing protein at short intervals (weekly, bi-weekly or alternate day) can not only improve the meat quality but also results into better economics gains. Prevailing BIS[3] feeding standard for broilers recommends only two grow out periods namely starter (0-6 weeks) and finisher (7-8 weeks).Therefore the present study was conducted to compare the growth performance, meat quality and economics of production of broiler subjected to decreasing dietary protein levels as against BIS recommendations.

MATERIALS AND METHODS

The present study was conducted on 81 Vencob broiler chicks obtained from M/S Venky's (India) Ltd. at poultry farm of the department of Livestock Production and Management, GADVASU, Ludhiana.

Housing and management:

The chicks were reared on deep litter system with standard managemental practices. Standard starter rations as per BIS (1992) containing 23 percent protein and 2800 kcal ME/kg on dry matter basis was prepared (Table 1) and fed up to 3 weeks of age.

Grouping and dietary treatment:

At three weeks age, chicks were divided into two treatments T_B (control) and T_P (phase fed), each having 2 replicates of 20 chicks. The chicks in all groups had equal number of sexes and average body weight. Chicks in T_B (control) were continued on BIS (1992) recommended levels of protein (23 % up to 6 weeks and 20% in 7 and 8 weeks of age), while chicks in T_P from 3 weeks, were offered a series of five diets containing protein levels of 22, 21 and 20% fed during 4th, 5th

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and 6th week, respectively and, 20 and 19% protein fed respectively during 7th and 8th week of age (Table 1). The amino acids requirements in diets were reduced proportionately with reduction in protein percent of phase fed diets.

The detailed formula and nutrient composition of different diets is given in Table. 2.

Dressing of birds for carcass characteristics:

At 42 days of age, 2 male and 2 female birds from each treatment were randomly picked up and kept off feed for 8-10 hours. The birds were slaughtered by cutting jugular vein. Scalding was done by immersing killed birds in hot water at 50-60^{0}C temperature for 30-40 seconds. Thus feathers were plucked manually. The carcasses were thoroughly washed in running water and put in ice chilled water for minimum 3 hours before removing the abdominal fat.

Observations recorded:

Average weekly feed consumption and body weight were recorded to evaluate growth performance and economic analysis. Growth performance was evaluated on body weight gain, feed conversion ratio and protein efficiency ratio and economic analysis on feeding cost per bird, feeding cost per kg live weight and margin of receipt over feeding cost.

Statistical analysis:

The data recorded on all the parameters were analyzed for statistical significance using multiple range test[5].

RESULTS AND DISCUSSION

Growth Performance:

The data on growth performance presented in Table 3, indicates that body weight gain in chicks fed as per BIS standard and phase feeding during 4-6 weeks (1242.88 *vs* 1223.75g) and during 7-8 weeks (931.52 *vs* 948.47g) did not differ significantly (p d" 0.05). The body weight achieved at the end of 8th week in T_B and T_P 2721 and 2715g, respectively, were almost similar. Although cumulative feed consumption and feed conversion ratio in BIS group chicks was numerically higher but no significance difference (p d" 0.05) was recorded during different periods in BIS and phase fed chicks though protein percent of diet was lowered by 2% up to 6th week of age. The results of protein consumption reveals that during starter, finisher and total grow out period, inspite of lower protein consumption of chicks in phase fed groups protein efficiency ratio was higher than chicks in BIS. Earlier workers also reported that lowering protein content with advancing of age does not influence growth performance[2&7].

Carcass characteristics:

Similar to earlier reports[8], carcass characteristics after 6th and 8th weeks (Table. 4) showed no significant difference in eviscerated carcass yield and prime cuts (breast, wing and leg yield) among treatments. Although, abdominal fat yield in phase fed groups was significantly (p d" 0.05) higher than BIS groups but magnitude of increase in percent abdominal fat from 6th to 8th week in phase fed treatments was lower than BIS control treatment.

Feeding Economics:

The data on production economics presented in table 5, revealed that in comparison to BIS. Feeding cost and gross income per bird in Phase fed groups after 6 weeks of age was 6.11 and 1.53% and, after 8 weeks of age was 4.60 and 0.10% lower than chicks in BIS groups. Margin of receipt per bird in phase fed group after 6 and 8 weeks of age was 5.03 and 7.47% higher than chicks in BIS groups. Similar to earlier reports[1&4] higher margin of receipt in phase fed group can be attributed to comparatively higher reduction in feeding cost than the gross income. It can be concluded that reduction of dietary protein in broiler ration after three weeks of age improved income without affecting growth performance and carcass yield. Therefore, an additional saving in feeding can be made simply by formulating more diets by reducing dietary protein content weekly after three weeks of age instead of two diets in conventional BIS feeding schedule.

Table 1: Dietary protein levels in different treatments

BIS group	Percent protein in different diets at different age					
	Starter				Finisher	
Age (wk)	0-3	4th	5th	6th	7th	8th
BIS (T_B)	23	23	23	23	20	20
Phase feeding (T_P)		22	21	20	20	19

Table 2: Formula and nutrient composition of experimental diets

Ingredients	Treatments							
	BIS (T_B)		Phase feeding (T_P)					
	BS	BF	BS	BS 1	BS2	BS3	BF	BF1
	0-6	7-8	0-3	4th	5th	6th	7th	8th
Maize	39.00	46.73	39.00	40.40	42.20	44.00	46.73	48.33
SBM	31.70	24.30	31.70	29.10	26.44	23.90	24.30	21.60
DORB	22.50	22.00	22.50	23.71	24.58	25.24	22.00	23.10
Molasses	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
DCP	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
M. powder	1.12	1.40	1.12	1.12	1.12	1.20	1.40	1.40
Salt	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Lysine	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Meth.+Cyst.	0.18	0.07	0.18	0.17	0.16	0.15	0.07	0.07
Additives	+	+	+	+	+	+	+	+
Crude protein (%)	23	20	23	23	23	23	20	19
ME (kcal/kg)	2800	2900	2800	2800	2800	2800	2900	2900
Lysine (%)	1.20	1.00	1.20	1.15	1.10	1.04	1.00	0.95
Meth.+Cyst.(%)	0.90	0.70	0.90	0.86	0.82	0.78	0.70	0.67

+Additive (g/100kg): Indomix K (vitamin A+B_2+D_3+K) 20g: Meriplex (vitamin B-complex) 30g: Merivite M (vitamin B_{12}) 20g: Trace minerals 100g: Choline chloride 50g: Cygro (coccidiostat) 50g.

*Methionine + cystine content was reduced proportionately with reduction in protein content of phase feeding diets.

Table 3: Growth performances of chicks on different dietary protein treatment

Parameter	Starter (0-3 wks)	BIS (T_B)			Phase feeding (T_P)		
		Starter (4-6 wks)	Finisher (7-8 wks)	Total (4-8 wks)	Starter (4-6 wks)	Finisher (7-8 wks)	Total (4-8 wks)
Body weight gain (g)	544.43	1242.88	931.52	2174.74	1223.75	948.47	2172.22
Feed consumption (g)	911.0	2879.5	2778.0	5657.5	2851.5	2736.0	5587.5
Feed conversion ratio (FCR)	1.67	2.31	2.98	2.60	2.33	2.88	2.57
Protein consumption (g)	189.31	598.35[a]	502.26[a]	1100.61	538.18[b]	481.51[b]	1019.69
Protein efficiency ratio	2.875	2.077[a]	1.855[a]	1.976[a]	2.274[a]	1.970[a]	2.130[a]

Figures with different superscripts for the same period in different treatment differ significantly ($p \leq 0.05$).

Table 4: Carcass characteristics of chicks on different dietary protein treatment

Traits	At 6 weeks of age		At weeks of age	
	BIS (T_B)	Phase feeding (T_P)	BIS (T_B)	Phase feeding (T_P)
Percent evis.wt/ live wt	71.42 ±1.48	71.75 ±0.19	73.12 ±0.52	72.93 ±0.59
Percent breast wt/evis.carcass wt	29.47 ±0.64	28.33 ±0.36	28.83 ±0.82	29.00 ±0.74
Percent leg wt/evis.carcass wt	29.54 ±0.71	28.19 ±0.86	27.94 ±0.53	28.54 0.55
Percent wing wt/evis.carcass wt.	11.93 ±0.13	12.08 ±0.10	11.91 ±0.20	11.78 ±0.17
Percent abd. Fat wt/evis.carcass wt	1.37 ±0.56^b	2.69 ±0.58^a	1.48 ±0.16^b	2.35 ±0.64^a

Figures with different superscripts for the same period in different treatment differ significantly ($p \leq 0.05$)

Table 5: Economics of broiler production on different dietary protein treatment

Parameters	After 6 week		After 8 week	
	BIS (T_B)	Phase feeding (T_P)	BIS (T_B)	Phase feeding (T_P)
Feeding cost/bird sold @31Rs./kg weight(Rs.)	23.06	21.65	43.49	41.49
% difference in feeding cost in phase over BIS group per bird	-	-6.11	-	-4.60
Gross income/ bird sold @ 31 Rs./kg live weight(Rs.)	38.53	37.94	67.41	67.34
% difference in Gross income in Phase over BIS group per bird	-	-1.53	-	-0.10
Margin of receipt/bird sold @ 31 Rs./kg live weight (Rs.)	15.47	16.29	23.92	25.85
% margin of receipt in Phase over BIS group per bird	-	5.03	-	7.47

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