

FEEDING VALUE OF EXTRUDED HATCHERY WASTE MIXTURE IN POULTRY - PERFORMANCE OF COMMERCIAL BROILERS

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ABSTRACT

Extruded hatchery waste mixture was fed to commercial broiler chicks from 1 through 8 weeks, replacing the fish meal at 33.3, 66.6 and 100 percent levels in the rations, in order to evaluate its feeding value vis-a-vis the fish meal. Six hundred and forty, one-week old chicks were divided into 4 groups on equal weight and equal sex basis. Each group had 2 replicates. Hatchery waste replaced the fish meal at 0 (T₁), 33.3 (T₂), 66.6 (T₃) and 100 (T₄) percent levels in broiler rations. The body weight gains were 1443, 1383, 1410 and 1368g in T₁, T₂, T₃ and T₄ groups, respectively, whereas FCR values were 2.62, 2.67, 2.60 and 2.67 in the corresponding treatments. Both the body weight gains and FCR revealed no statistically significant difference among different treatment groups. The profits earned over the sale of 1000 broilers from each group were Rs. 13286.02, 11869.55, 14379.18 and 12599.30 in T₁, T₂, T₃ and T₄ treatments, respectively. It can be concluded that the hatchery waste can replace the fish meal from broiler rations completely.

INTRODUCTION

The hatchery waste contains a good amount of high quality protein and calcium as indicated by Dhaliwal (1995). In addition, a good amount of vitamins and minerals are also present. Dhaliwal (1995) prepared a mixture of soybean flakes and hatchery waste in a ratio of 60:40 and extruded the mixture for elimination of the microbes from the hatchery waste rendering it safe for poultry feeding. Kempster (1945), Wisman (1964) and Ilian and Salman (1986) incorporated hatchery waste from 2 to 6 percent in the broiler diet replacing the meat scrap, skim milk and soybean cake from the ration. The data on replacement of fish meal from broiler ration are scanty. It was, therefore, decided to investigate the replacement of fish meal with the hatchery waste in the broiler rations.

MATERIALS AND METHODS

The hatchery waste was collected and processed, as previously described (Dhaliwal *et al.*, 1996). Other feed ingredients used for feeding of chicks viz. maize, solvent extracted soybean flakes, fish meal, minerals and vitamins were procured from Punjab Agricultural University feed store in one lot to avoid sample variations in relation to their chemical composition. All these ingredients were analysed for proximate analysis as per AOAC, (1980) method. Four rations were formulated, replacing the fish meal with hatchery waste at 0, 33.3, 66.6 and 100 percent levels on isoproteinic

basis. The actual levels of incorporation of hatchery waste in the rations were worked out to be 0, 3.43, 6.86 and 10.30 percent in place of 9, 6, 3 and 0 percent fish meal in the rations. The formula composition of the rations is given in Table 1 and the chemical and amino acid composition of the rations is given in Table 2. The four rations thus formulated constituted the treatments T₁, T₂, T₃ and T₄ maintaining the nutrient density as per National Research Council (1984) recommendations.

One week-old commercial broiler chicks were divided on equal weight and sex basis into 4 treatment groups, with each treatment group having 2 replicates of 80 chicks each. The chicks were reared on slatted floor, providing 1 sq. ft. floor, space/bird. All the chicks were given standard brooding management through 6 weeks of age. Fresh feed and clean water were provided *ad libitum*. The feed was provided four times a day in order to avoid wastage and actual amount of feed eaten was recorded each week. The mortality, if any, was recorded each day and feed adjusted for the dead bird. The body weight of individual bird was recorded at the start of experiment and every week thereafter upto 8 weeks of age.

Statistical difference in response of various parameters viz. body weight, rate of gain in body weight, feed conversion ratio, protein efficiency ratio and mortality were determined through analysis of variance and treatment means were compared by the method suggested by Snedecor and Cochran (1967).

Table 1: Formula composition of experimental rations (Parts per hundred parts)

Ingredients	Treatments			
	T ₁	T ₂	T ₃	T ₄
Maize	60	59.57	59.13	58.69
Solvent extracted soybean flakes	26	20.86	15.70	10.54
Fish meal	9	6	3	Nil
Extruded hatchery waste mixture ^{1,2}	Nil	8.57	17.17	25.17
Dicalcium phosphate	2	2	2	2
Lime stone	3	3	3	3
Constants ³	+	+	+	
Cost per 100Kg (Rs.)	454.99	436.40	417.79	399.18

1. Extruded hatchery waste mixture was prepared by mixing solvent extracted soybean flakes and dried hatchery waste in ratio of 60:40. Therefore, actual replacement of fish meal was 3.43 for 3% level, 6.86 for 6% level and 10.30% for 9% level of fish meal on isoprotein basis.
2. Cost of extrusion was 50 paise per kg and it has not been added in the cost of experimental ration.
3. Supplied per 100 kg of diet: Minerals; NaCl, 500g; MnSO₄, 33g; KI, 0.3g, MgSO₄, 115g, FeSO₄.7H₂O, 28g, CuSO₄.5H₂O, 0.8g; ZnCO₃, 9.7g; and vitamins; Vit. a. 1000000, i.u.; D3, 6000 i.c.u.; DL-alpha tocopheryl acetate, 1g; menadione, 0.1g; Thiamine HCl, 180 mg; Riboflavin, 300 mg; Calc. Pantothenate, 1g; Niacin, 27g; Pyridoxine, 300 mg; Biotin, 9mg; Choline chloride, 130g; folic acid, 120mg; B₁, 0.9mg.

RESULTS AND DISCUSSION

Weekly body weight gain in various treatment groups during eight week experimental period are given in Table 3. The rate of weight gain was almost similar in all the groups.

The body weight gain, feed intake per bird, feed conversion ratio, protein efficiency ratio and mortality during the experimental period in the birds of different treatments is given in Table 4. The body weight gains in different treatments indicated no statistical difference. The gains were 1443, 1383, 1410 and 1368 g in T₁, T₂, T₃ and T₄ treatments, respectively. It shows that the extruded hatchery waste mixture may replace the fish meal from the commercial broiler rations completely. A similar trend was observed in feed conversion ratio and protein efficiency ratio, indicating that the feed consumption and protein utilization in the birds given the rations containing extruded hatchery waste mixture is not affected. Asyali *et al.* (1983) observed a significantly improved body weight gain in birds fed hatchery waste. According to Kundu *et al.* (1986) and Ilian and Salman (1986), hatchery can completely replace the fish meal from the broiler ration by incorporating hatchery waste at 2.5 and 5.0 per cent levels.

The cost of rations (Table 4) containing extruded hatchery waste were Rs. 454.99, 436.40, 417.79 and 399.18 for T₁, T₂, T₃ and T₄ diets, respectively. The body weights at 8 weeks of age were 1547, 1483, 1514

and 1471 g/bird (combined sexes) and feed intake/bird through 8 weeks was 3787, 3693, 3668 and 3658g in T₁, T₂, T₃ and T₄, respectively. The livability rates in T₁, T₂, T₃ and T₄ treatments were 91.8, 90.6, 94.3 and 93.7 per cent, respectively. At the end of 8 weeks, the birds were dressed and the evisceration percentages in the corresponding treatments were 67.80, 66.98, 67.43 and 67.17 per cent. The eviscerated birds were sold @ Rs. 40.00 per kg dressed weight. The expenses for producing 1000 broilers to marketing age (cost of chicks + feed consumed) were Rs. 28668.38, 27705.65, 26459.22 and 25807.98 in T₁, T₂, T₃ and T₄ treatments, respectively, while the returns of Rs. 13286.02, 11869.55, 14379.18 and 12599.30 were earned, respectively, in T₁, T₂, T₃ and T₄ treatments. The results indicated that for optimizing the profits from feeding of extruded hatchery waste, it may completely replace the fish meal in the rations of commercial broiler chicks.

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Table 2: Chemical and amino acids composition of experimental rations (per cent basis)

	Ration				
	T ₁	T ₂	T ₃	T ₄	
Chemical composition					
Dry matter	91.18	91.82	92.08	92.87	
Crude protein	22.62	22.55	22.54	22.52	
Ether extract	2.90	3.12	3.25	3.39	
Crude fibre	2.62	3.17	2.73	4.29	
Ash	7.23	7.10	7.12	7.32	
Nitrogen free extract	64.64	64.06	83.37	62.48	
Calcium	2.28	2.32	2.82	3.31	
ME (Kcal kg diet)	2967.00	2863.00	2875.00	2829.00	
Amino acid contents					
	T1	T2	T3	T4	Requirement
Arginine	1.09	1.19	1.33	1.46	1.20
Lysine	0.81	0.92	0.98	1.08	1.00
Methionine	0.54	0.57	0.61	0.66	0.45
Cystine	0.31	0.33	0.36	0.39	0.35
Glycine	0.82	0.94	1.08	1.22	1.90
Histidine	0.52	0.56	0.61	0.66	0.30
Isoleucine	1.24	1.31	1.40	1.49	0.60
Leucine	2.54	2.64	2.81	2.94	1.40
Phyeny alanine	1.06	1.07	1.16	1.25	0.70
Trysoine	1.07	1.10	1.19	1.21	0.70
Threonin	0.73	0.80	0.90	0.90	0.60
Trypotphan	0.16	0.21	0.23	0.27	0.20
Valine	1.06	1.16	1.29	1.42	0.80

Table 3: Body weights (g) in commercial broilers in various treatment groups during the experimental period

Age in weeks	T1	T2	T3	T4
1st	104.00±1.00	100.00±1.00	104.00±1.00	103.00±1.05
2nd	191.00±2.24	193.00±2.19	184.00±2.37	176.00±2.23
3rd	376.00±4.38	336.00±3.94	336.00±4.06	319.00±4.35
4th	617.00±5.32	557.00±6.29	548.00±6.48	533.00±7.16
5th	853.00±11.00	791.00±10.77	792.00±8.99	755.00±9.61
6th	1115.00±10.16	1076.00±10.31	1057.00±11.38	1027.00±11.71
7th	1418.00±12.14	1315.00±14.31	1339.00±13.24	1308.00±13.73
8th	1547.00±14.27	1483.00±15.76	1514.00±12.83	1471.00±11.61
Average	1443	1383	1410	1368

Table 4: Economics of raising 1000 broilers fed with various levels of upto 8 weeks of age.

Parameters	T1	T2	T3	T4
Cost of ration (Rs.)	454.99	436.40	417.79	399.18
Body weight (g)	1547.00	1483.00	1514.00	1471.00
Body weight gain (g)	1443.00	1383.00	1410.00	1368.00
Feed intake per bird (g)	3787.00	3693.00	3668.00	3658.00
Feed conversion ratio	2.62	2.67	2.60	2.67
Feed consumption	856.00	831.00	826.00	8.23
Protein efficiency ratio	1.685	1.664	1.707	1.66
Mortality (%)	8.2bc	9.4a	5.7a	6.3b
Livability (%)	91.80	90.60	94.30	93.70
Cost of chicks (Rs.)	10.50	10.50	10.50	10.50
Cost of 1000 live broilers (Rs.)	11437.91	11589.40	11134.68	11205.98
Cost of feed (Rs.)	17230.47	16116.25	15324.54	14602.00
Total body weight (kg)	1547.00	1483.00	1514.00	1471.00
Cost of live weight (Rs.)	30940.00	29660.00	30280.00	29420.00
Eviscerated weight (kg)	1048.86	989.38	1020.96	968.57
Cost (Rs.)	41954.40	39575.20	40838.40	3874280.00
Expenses (Rs.)	28668.38	27705.65	26459.22	25807.98
Income (live weight basis, in Rs.)	30940.00	29660.00	30280.00	29420.00
Profit (Rs.)	2271.62	1954.35	3820.78	3612.02
Income (eviscerated weight basis in Rs.)	41954.40	39575.20	40838.40	38404.80
Profit (Rs.) (eviscerated basis)	13286.02	11869.55	14379.18	12599.30

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