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Effect of Different Protein Concentrates Replacement of Fish Meal on the Performance of Broiler

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Abstract: An experiment was conducted with 128, 7 days old Vencobb broiler chicks to study the effect of feeding different protein concentrates (Jasoprot, Provita, Fishpro) on the performance of broiler. The dietary treatment was fish meal based control diet where fish meal was replaced by different protein concentrates. The live weight of broilers fed different protein concentrates differed significantly ($p < 0.01$) at 4, 5 and 6th weeks of age. The live weight gain during 2-6 weeks in Jasoprot was higher than other treatments. Broilers fed Josoprot diet had better feed conversion ratio than other dietary treatments. At 6 weeks of age, the production number in Jasoprot diet was significantly ($p < 0.01$) higher than other dietary treatments. Similar trend was observed in performance index. Survivability was similar in different treatments during the experimental period. Net profit was higher ($p < 0.01$) in Jasoprot diet as compared to other treatments. It can be concluded that protein concentrates available in the market could replace fish meal from broiler diet with satisfactory performance. However, Jasoprot seems to be the best as protein concentrates studied in respect of broiler performance and financial return.

Key words: Protein concentrates, fish meal, broiler

Introduction

Successful broiler rearing depends on many factors like availability of feed ingredients at a reasonable cost, proper management and quality chicks. Among these factors, feed cost accounts for 65-70 percent of the total production (Hossain *et al.*, 1989). Moreover, the price of protein ingredients are comparatively higher than that of the other ingredients; protein costs involve about 45 percent of the total feed cost. Now a days, the cost of feed ingredient has been steadily increased all over the world. This is not only inflationary factor but also for reducing the availability of poultry feed ingredients.

There are two sources of feed protein i.e. protein of animal origin and protein of plant origin. Plant proteins are usually low in lysine and methionine (Patrick, 1953) and its biological value is lower (Dagir, 1976). In a broiler ration, fish meal, meat and bone meal and other protein concentrates are predominantly the principal sources of animal protein. The nutritional value of fish meal is better than that of plant protein in respect of biological value and essential amino acids profile.

Traditionally fish meal is being used mostly as an only source of animal protein in the formulation of poultry feed; but is subjected to some limitations for using in the diet of poultry. The fish meal available in the market is not good and its quantitative supply is not steady throughout the year. The price of fish meal is also higher than other protein source ingredients and its price is

increasing day by day. Moreover, the supply of fish meal is often affected by the natural calamities (Nazneen, 1995). Therefore, the quality of fish meal is often questioned because of adulteration with other adulterating materials such as fish bones, sands, saw dust, fish scales, etc. (Ali, 1993). Sometimes it carries organism of certain diseases. Successful use of cheaper protein as substitute of costly fish meal may reduce the production cost of balanced poultry feed and at the same time it will reduce dependence on fish meal. For this reason, it is very important to find out the possibilities of using alternate source of low cost protein to substitute expensive fish protein. Kushak *et al.* (1990) reported that the cost of feeding chickens decreased with increasing fish meal replaced by protein concentrates. They also reported that the cost of feed per kg live weight gain and overall production cost were lower when fish meal was completely replaced by protein concentrates.

In Bangladesh, the objective of quality control of poultry feed is to ensure that the formulation of poultry ration should be unadulterated. At present, a number of protein concentrates are available in the market. Their compositions vary and their prices are also different. On the other hand, better performance of broiler can be obtained by using protein concentrates than fish meal without any harmful effect (Baker and Bro, 1968). As protein concentrates is a source of animal origin, so its

biological value is better and essential amino acids are also rich (Petrick, 1953 and Dagir, 1976). Nutritionists are looking for good quality animal protein at a lower cost to feed the birds. Protein concentrates can safely be used as a substitute of fish meal. It will further reduce the production cost of poultry diet with a consequent increase in profitability of broiler production.

Besides this, the quality of different protein concentrates and their effect on the performance of broiler need to be tested by feeding trial. Therefore, the present work was undertaken to investigate the effect of different protein concentrates as replacement of fishmeal compare the performance of broiler.

Materials and Methods

The experiment was conducted with one hundred and twenty eight 7 days old Vencobb broiler chicks for a period of 42 days. The chicks were randomly distributed to four dietary treatments having four replications of 8 birds in each. The lay out of the experiment is shown in Table 1. The experimental room was divided into sixteen equal littered floor pens of 120 cm × 190 cm by using wire-net and wooden materials.

There were 4 dietary treatments in the study in which one was fish meal based control diet and the other three were Jasoprot, Provita and Fish-pro based diets. The birds were fed a broiler starter diet from 7 days to 21 days of age and finisher diet from 22 to 42 days of age. The feed was supplied *ad libitum* as dry mash. Fresh, cool and clean drinking water was supplied all the times during the whole experimental period. The ingredients were selected on the basis of availability in the local market. Maize, rice polish Soyabean meal and fish meal based control diet was prepared. The other ingredients were prepared with Jasoprot, provita and fish-pro protein concentrates by replacing fish meal from control diet. The chemical composition of basal diet is shown in Table 2.

The birds were immunized against Newcastle Disease, Infectious Bronchitis and Gumboro disease administering Nobilis MA5+clone 30 at 1st day and Nobilis Gumboro 228E and D78 at 11th and 21st day old. Megavit-WS (1g/5 litre at 8th to 9th day and 16th to 17th day) and Tiamutin hydrogen fumerate (1g/12 litre at 11th to 12th day and 1g/8 liter at 18th day) were added to the drinking water to prevent birds from heat stress and infection. During the experimental period, initial and weekly body weight, feed consumption, temperature and relative humidity, mortality etc were recorded. To evaluate different treatments weight gain, feed conversion ratio, survivability, production number, performance index, production cost etc parameters were considered. Data collected and calculated for different parameters were subjected to analysis of variance (ANOVA) using a MSTAT statistical computer package programme according to the principles of Completely

Randomized Design (CRD). Least significant differences (LSD) were performed to compare the mean values having significant difference between treatments.

Table 1: Lay out of the experiment

Dietary Treatments	Number of birds per replication				Total number of birds
	R ₁	R ₂	R ₃	R ₄	
T ₁	8	8	8	8	32
T ₂	8	8	8	8	32
T ₃	8	8	8	8	32
T ₄	8	8	8	8	32
Total					128

Where, T₁ = Fish meal based diet (Control), T₂ = Jasoprot based diet, T₃ = Provita based diet, T₄ = Fishpro based diet

Results and Discussion

The effect of feeding different protein concentrates by replacing fish meal on live weight of broilers are shown in the Table 3. It is evident from Table 3 that body weight was significantly ($p < 0.01$) improved in Jasoprot (T₂) and Fishpro (T₄) based diets than fish meal based control diet (T₁). However, the body weight in Provita (T₃) and control diet (T₁) were similar. The results partially agreed with the result of Chrappa and Sabo (1990); Stojanovic *et al.* (1984); Kushak *et al.* (1990); Tikhonovskaya and Snitsar (1992) who found higher body weight of broilers with protein concentrates based diet as compared to fish meal based diet. Relationship among age and live weight of broiler are shown in Table 3.

The effect of feeding different protein concentrates on live weight gain of broilers at different stages of growth are shown in Table 3. Live weight gain of birds during 2 to 3 weeks of age were 320.03, 322.50, 309.28 and 317.66 g in dietary treatments T₁, T₂, T₃ and T₄ respectively and differences were non-significant ($P > 0.05$). During 4 to 6 weeks of age the live weight gain with T₂ (Jasoprot based diet) was found significantly ($P < 0.01$) higher than those observed in T₁ and T₃ group. During the experimental period (2-6 weeks of age), the live weight gain in T₂ (Jasoprot) was significantly ($P < 0.01$) improved than other treatment groups. The results are partially agreed with the previous reports of Snitsar *et al.* (1986); Chrappa and Sabo (1990); Apkhinov *et al.* (1991); Han *et al.* (1998) who observed the highest live weight gain of birds that consumed protein concentrates based diet.

Feed consumption by birds of different treatments for different period of growth are shown in Table 3. Feed consumption of birds during different stages of growth on different dietary treatments were statistically non-significant ($P > 0.05$). The results are similar with the findings of Ochetim (1991) who reported that when locally produced fish waste meal and meat bone meal (MBM) in broiler rations were used, no significant differences on feed consumption was observed.

Table 4 shows the values for feed conversion ratio

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Table 2: Chemical composition (calculated) of the broiler starter and finisher ration

Nutrients	Broiler starter				Broiler finisher			
	T ₁	T ₂	T ₃	T ₄	T ₁	T ₂	T ₃	T ₄
Metabolizable Energy (kcal/kg)	3168	3186	3176	3183	3200	3216	3206	3213
Crude Protein (%)	22.66	22.86	22.90	22.75	19.87	20.00	19.97	19.82
Calcium (%)	0.82	0.72	0.77	0.73	0.80	0.70	0.74	0.71
Phosphorus (%)	0.64	0.75	0.74	0.74	0.60	0.75	0.85	0.75
Lysine (%)	1.11	1.05	1.10	1.00	0.94	0.88	0.54	0.83
Methionine (%)	0.37	0.34	0.35	0.34	0.34	0.31	0.32	0.31
Tryptophan (%)	0.25	0.21	0.21	0.17	0.21	0.17	0.17	0.13

Where, T₁ = Fish meal based diet (Control), T₂ = Jasoprot based diet, T₃ = Provita based diet, T₄ = Fishpro based diet.

Table 3: Feed consumption (g), body weight (g), and weight gain (g) of broiler on different Dietary treatment groups at different weeks of age

Parameter	Age in weeks	Dietary treatment groups				Level of significance	LSD value
		T ₁	T ₂	T ₃	T ₄		
Feed consumption (g)	2-3	597.12	597.81	606.05	563.43	NS	
	4-6	1799.50	1779.68	1790.06	1808.87	NS	
	2-6	2409.12	2377.50	2395.50	2397.18	NS	
Live weight (g)	1 st	106.15	106.09	106.09	105.93	NS	-
	2 nd	203.12	223.43	210.93	217.07	NS	-
	3 rd	384.37	427.34	415.37	423.59	NS	-
	4 th	673.54 ^b	735.93 ^a	679.68 ^b	729.68 ^a	**	31.68
	5 th	971.87 ^b	1037.37 ^a	981.12 ^b	1000.00 ^b	**	30.43
	6 th	1220.00 ^c	1380.00 ^a	1233.12 ^c	1287.00 ^b	**	42.47
Weight gain (g)	2-3	320.03	322.50	309.28	317.66	NS	-
	4-6	793.56 ^b	952.65 ^a	817.62 ^b	864.40 ^{ab}	**	93.57
	2-6	1102.34 ^c	1273.90 ^a	1126.91 ^{bc}	1182.06 ^b	**	55.6

Where, T₁ = Fish meal based diet (Control), T₂ = Jasoprot based diet, T₃ = Provita based diet, T₄ = Fishpro based diet. The figure in a row having similar alphabet do not differ significantly. NS, Non-significant (P>0.05), ** (P<0.01)

Table 4: Feed conversion ratio, production number, survivability, performance index of birds on different treatments at different weeks of age

Parameter	Age in weeks	Dietary treatment groups				Level of significance	LSD Value
		T ₁	T ₂	T ₃	T ₄		
Feed Conversion Ratio (FCR)	2-3	1.904	1.867	1.968	1.856	NS	-
	4-6	2.278 ^a	1.870 ^b	2.196 ^a	2.095 ^{ab}	*	0.29
	2-6	2.187 ^a	1.866 ^b	2.126 ^a	2.027 ^{ab}	**	0.19
Production Number	2-3	112.89	109.81	102.10	109.23	NS	-
	4-6	258.37 ^b	352.84 ^a	268.58 ^b	283.59 ^b	**	54.88
	2-6	133.88 ^c	176.35 ^a	138.25 ^{bc}	151.48 ^b	**	16.34
Survivability	2-6	100.00	100.00	100.00	96.87	NS	-
Performance Index	2-3	23.70	23.06	21.43	22.93	NS	-
	4-6	54.25 ^b	74.09 ^a	56.39 ^b	61.68 ^{ab}	**	12.47
	2-6	55.91 ^c	74.06 ^a	58.06 ^{bc}	63.62 ^b	**	7.12

Where, T₁ = Fish meal based diet (Control), T₂ = Jasoprot based diet, T₃ = Provita based diet, T₄ = Fishpro based diet. The figure in a row having similar alphabet do not differ significantly. *P< 0.05, ** P< 0.01, NS, Non-significant (P>0.05)

(FCR) of different dietary treatment groups. From 2-3 weeks of age, it can be observed from the Table 4 that the efficiency of utilization of feed by birds fed on dietary treatment group T₄ is better but the difference among different dietary treatments were non-significant (P>0.05). During 4-6 weeks of age, the birds of different treatments (T₁ & T₃) showed more or less same feed conversion efficiency having no significant differences among them except that of T₂ which differed significantly (P<0.05) with those of T₁, T₃ and T₄. During the entire period of 2-6 weeks of age, the feed efficiency of T₂ was

distinctly better than those of other treatments and the difference among them was statistically highly significant (P<0.01). The results are partially agreed with Tikhonovskaya and Snitsar (1992) who observed better-feed conversion of broiler with protein concentrates.

The production number calculated at different ages of birds fed different protein concentrates are shown in Table 4. During the entire period of 2-6 weeks of age, it was observed that the difference of production number among different dietary treatments was statistically highly significant. It is evident (Table 4) that production

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Table 5: Total cost of production and profit per live broiler on different dietary treatment groups at 6 weeks of age

Parameters	Dietary treatment groups				Level of significance	LSD Value
	T ₁	T ₂	T ₃	T ₄		
Live weight (g) per bird	1220.00 ^d	1380.00 ^a	1233.12 ^c	1287.00 ^b	**	6.57
Feed cost per bird	29.94	28.95	29.19	29.12	NS	-
Chick cost per bird	21.50	21.50	21.50	21.50	NS	-
Miscellaneous cost/bird	8.00	8.00	8.00	8.00	NS	-
Total cost per bird	62.05	61.06	61.30	61.23	NS	-
Live sold per bird	79.30 ^b	89.70 ^a	80.15 ^b	83.65 ^b	*	5.19
Profit per bird	17.24 ^b	28.63 ^a	18.84 ^b	22.14 ^{ab}	*	5.87
Total cost per treatment	1985.76	1954.04	1961.79	1959.53	NS	-
Total sold per treatment	2537.60 ^b	2870.40 ^a	2564.89 ^b	2593.30 ^b	**	98.23
Net profit per treatment	551.84 ^b	916.35 ^a	603.10 ^{ab}	633.76 ^{ab}	**	19.42

Where, T₁ = Fish meal based diet (Control), T₂ = Jasoprot based diet, T₃ = Provita based diet, T₄ = Fishpro based diet.

The figure in a row having similar alphabet do not differ significantly. P < 0.05. ** P < 0.01, NS, Non-significant (P > 0.05)

number was significantly improved in Jasoprot (T₂) than other treatments during finisher (4-6 weeks) and overall experimental period (2-6 weeks) but not at during starter period (2-3 weeks).

The survivability of birds during the experimental period among the different dietary treatment groups is shown in Table 4. It is evident that survivability of birds in different treatments was similar during the whole experimental period (2-6 weeks) and the differences were non-significant among the different dietary treatments. Post-mortem reports confirmed that birds did not die due to the effect of protein concentrates. The results agreed well with the previous reports of Snitsar *et al.* (1986), Baker (1968) who found that protein concentrates had no adverse effect on survivability of broilers.

Table 4 shows the performance index of broilers fed on different protein concentrates at different weeks of age. During 2-3 weeks of age, no significant difference was observed on the performance index among different treatment groups. The performance index with Jasoprot (T₂) was found significantly (P < 0.01) higher than those observed in T₁ & T₃ during finisher period (4-6 weeks). During the entire period of 2-6 weeks of age, Jasoprot (T₂) had the significant highest index value.

Analysis of cost factors (Table 5) indicates that the total cost of production per live broiler was 62.05, 61.06, 61.30 and 61.23 Tk. on different dietary treatment groups T₁, T₂, T₃ and T₄ respectively. No significant differences were observed among the different dietary treatment groups for feed cost, chick cost and total cost per live broiler. Significant differences (P < 0.01) were observed among treatment groups for total sales and profit. Results in Table 5 also indicate that profit was significantly affected by variable feed cost and total cost of production. These results are in agreement with the findings of Kushak *et al.* (1990) who reported decreased feed cost per kg live weight gain, when fishmeal was replaced by protein concentrate. However, increased growth rate and decreased production cost were observed when fishmeal was replaced by different protein concentrate.

It may be concluded that protein concentrates available in the market could replace fishmeal in broiler diets. However, Jasoprot seems to be the best in respect of broiler performance and financial return.

References

- Ali, M.E., 1993. Replacement of fish meal by oyster meat meal in broiler ration. M. S. Thesis. Department of Poultry Science. Bangladesh Agricultural University, Mymensingh.
- Apkhipov, A., E. Laricheva, V. Alekseev, G. Batarev and V. Sindeev, 1991. A protein supplement. *Ptitsevodstvo*, 8: 12-13.
- Baker, H.J. and Bro, 1968. PRO-PAK 60% protein concentrate was created his research and development. U.S.A.
- Chrappa, V.H. and V. Sabo, 1990. Research into the possibility of replacing imported protein feeds by home-produced feeds in broiler fattening. *Vyskum domaceho povudu pri vykrme Kurciat. Zivbocisna Vyroba*. 35: 1054-1068.
- Dagir, N.J., 1976. Studies on poultry by-product meals in broiler and layer rations. *Nutr. Abs.*, 46: 1167.
- Han, I.K., J.H. Kim, X.S. Piao, S.H. Bae and Y.K. Han, 1998. Evaluation of Bio-V-ProR as an alternative protein source in broiler diets. *Asian-Aust. J. Anim. Sci.*, 11: 71-77.
- Hossain, M.D., S.M. Bulbul and M.A.R. Howlider, 1989. The composition of some unconventional feeds. *Poult. Adv.*, 22: 37-40.
- Kushak, R.I., I.L. Travid, N.A. Basova, E. Yukhno, N.p., L.P. Fillpchenkova, G.E. Isidorov and A.R. Val'dman, 1990. Effectiveness of different dose of fish protein concentrates in feeding of chickens. *Dolady Vsesoyuzhoi Ordena Lenina I ordeNA Trudovogo Krasnogo Znameni Akademii Sel'skhozyaistvenny auk in. V. I. Lenina*. No., 6: 51-54.
- Nazneen, T., 1995. Economic feasibility of feeding broiler offals a replacement of fish meal on the performance of growing pullets up to sexual maturity. M.S. Thesis. Dept. Poult. Sci., Bangladesh Agricultural University, Mymensingh.

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- Ochetim, S., 1991. Performance of broilers fed locally Produced fish waste meal in Western Samoa. Asian-Aust. J. Anim. Sci., 5: 91-95.
- Patric, H., 1953. Deficiencies in a sesame meal type ration for chicks. Poul. Sci., 32: 744-745.
- Snitsar, A.I., L.I. Steko'nikov and I.M. Chernukha, 1986. Use of wastes from the meal industry for finishing chickens. Myasnaya Industrya SSR. No., 12: 24-25.
- Stojanovic, S., M. Ristic and Stosavljevic, 1984. Nutrition value of hydrolyzes feather meal and hydrolyzes feather and blood meal with addition of lysine concentrate. Stocarstvo (Yugoslavia). 38: 429-434.
- Tikhonovskaya, N.D. and A.I. snitsar, 1992. Use of fishmeal with protein concentrates in the diet for broiler chickens. Netherlan World's Poul. Assoc., 620-621.