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## Effect of Using Local Fishmeal (*Liza abu*) as Protein Concentration in Broiler Diets

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**Abstract:** A total of 150 day-old chicks were fed five diets consisted of 0, 25, 50, 75 and 100% local fish meal instead of imported protein concentration. The trail lasted for 42 days. All fish meal levels chicks obtained similar body weight, feed consumption, feed conversion and mortality to those of control group. The percentage of carcass protein was significantly ( $p<0.05$ ) increased, while the percentage of fat significantly ( $p<0.05$ ) decreased. Tenderness and juiciness were not affected by the fish meal levels. The fish flavor of chicks carcasses was observed in the diets contains 75 and 100% local fishmeal.

**Key words:** Local fish meal, protein concentrate, broiler

### INTRODUCTION

High cost and high demand of protein concentrate resources lead to uneconomic poultry diets. Cost of feed incurs about 60-65% of the total cost of poultry production and protein costs about 13% of the feed cost (Banerjee, 1992). Cheap sources of protein are available as sources of feed ingredients such as fish meal. Fish meal is usually marketed at 65% crude protein, but this can vary from 57-77% depending on the species of the fish used (Maigualema and Gernet, 2003). Fish meal is an excellent source of protein. It is considered to be one of the best ingredients for broilers and layers, as it enhances the feed consumption and feed efficiency (Solangi *et al.*, 2002). Moreover, it contains all the essential amino acids, especially lysine and methionine, in adequate quantities required for poultry (Singh and Panda, 1990). Its enhancement of diets for young bird's growth factors (Leon, 1998).

Studies results using fish meal in broiler diets (Ponce and Gernat, 2002) showed no significant differences in body weight, feed consumption, feed conversion or carcass quality on broiler. Dobrzan'ski *et al.* (2003) reported that the modified dietary fish meal can be used in mixtures for broilers, but at a limited rate (Max 5%). Maigualema and Gernet (2003) obtained that tilapia by-product meal can be substituted instead soybean meal crude protein up to 50% without negatively effecting birds performance or carcasses. Salih (2009) showed no significant differences on broiler performance when used fish meal at levels 0, 1.5, 3.5 and 5% and improved carcass meat quality at level 3.5%, although there was not any mentioning of apparent fishy smell at any inclusion level.

This study reported here concentrated on the effect of using local fishmeal (*Liza abu*) on broiler performance, carcass quality and fish flavor.

### MATERIALS AND METHODS

One hundred and fifty day-old broiler chicks (FAWBRO) were distributed randomly with three replicates. Each of the 15 pens (1.5 x 2.5 m) used contained 10 chicks. Five dietary diets fish meal where fed to the chicks instead of importing protein concentrate at levels (0, 25, 50, 75 and 100) %.

The feed and water supplied to the chicks *ad libitum* for 42 days of age. Samples of ingredients and fish meal were analysis according to (AOAC, 1998) to find the chemical composition (Table 1). Chicks were weighted in groups, feed consumption recorded and feed conversion (feed: gain) were calculated at 2, 4 and 6 weeks of age. Economic Figure (EF) was calculated as:

$$EF = \frac{\text{Total weight of sold birds (kg)}}{\text{Number of sold birds} \times \text{the period of breeding} \times \text{feed conversion}} \times 1000$$

(Naji, 2006)

At the end of experiments, three chicks per treatment were slaughtered, dressed and determined their chemical composition of thigh and breast (AOAC, 1998). Tenderness, Juiciness and fish flavor were determined after cooking of carcass (Lyon and Lyon, 1990) as shown in Table 2. All data were classified according to a ANOVAs procedure of SPSS (1999). The significant treatment means were separated by using the multiple range test of Duncan (SPSS, 1999).

### RESULTS AND DISCUSSION

Replacement of protein concentrate with local fish meal, resulted no significant differences in broiler body weight, feed consumption and feed conversion at 2, 4 and 6 weeks of age (Table 3). This might be due to fishmeal contains all essential amino acids especially lysine and

Table 1: Chemical composition of experimental diets

Ingredients	Starter/level of fish meal					Grower/level of fish meal				
	0%	25%	50%	75%	100%	0%	25%	50%	75%	100%
Yellow corn	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Wheat	13.80	13.80	13.80	13.80	13.80	15.80	15.80	15.80	15.80	15.80
Soybean meal 45% (c.p)	24.00	24.00	24.00	24.00	24.00	20.00	20.00	20.00	20.00	20.00
Protein conc. 50%	10.00	7.50	5.00	2.50	0.00	10.00	7.50	5.00	2.50	0.00
Oil	0.00	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00	2.00
Local fishmeal#	0.00	2.50	5.00	7.50	10.00	0.00	2.50	5.00	7.50	10.00
Vitamin mineral premix	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Salt (NaCl)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
ME (kcal/kg)	3041.00	3038.00	3035.00	3031.00	3028.00	3088.00	3085.00	3082.00	3079.00	3077.00
Crude protein (%)	22.30	22.63	22.96	23.29	23.62	20.20	20.21	20.39	20.70	20.94
Crude fiber (%)	3.64	3.64	3.63	3.62	3.58	3.53	3.51	3.51	3.50	3.50
Fat (%)	3.07	2.93	2.80	2.67	2.54	4.96	4.85	4.74	4.63	4.52
Calcium (%)	1.27	1.29	1.32	1.38	1.41	1.30	1.35	1.43	1.51	1.57
Available phosphorus (%)	0.47	0.50	0.51	0.53	0.59	0.49	0.50	0.44	0.58	0.63
Methionine (%)	0.60	0.61	0.63	0.66	0.69	0.55	0.54	0.56	0.58	0.59
Lysine (%)	1.12	1.16	1.21	1.32	1.40	1.06	1.08	1.14	1.22	1.31

# contain: 2390 ME (kcal/kg), 60% CP, 1.8% EE, 2.5% CF, 1.2% Ash, 0.96% Methionine, 3.1% lysine, 0.3% Ca and 1.2% phosphor.

Table 2: Degree of panel test

Tenderness	Degree	Juiciness	Degree	Fishy flavor	Degree
Very excellent	1	Excellent	1	Very normal	1
Excellent	2	Large	2	Normal	2
Very good	3	Good	3	Very simple fishy	3
Good	4	Medium	4	Simple fishy	4
Poor	5	Poor	5	Middle fishy	5
Weak	6	Very dry	6	Strong fishy	6

Table 3: Effect of using local fish meal (*Liza abu*) on broiler performance

Parameter	Levels of fish meal in diets					SEM	Significant
	0%	25%	50%	75%	100%		
<b>Body weight (g)</b>							
2 (wks)	347.00	351.00	366.00	345.00	348.00	20.58	NS
4 (wks)	886.00	891.00	890.00	889.00	885.00	10.93	NS
6 (wks)	1716.00	1714.00	1721.00	1715.00	1711.00	26.49	NS
<b>Feed consumption (g/bird)</b>							
2 (wks)	460.00	468.00	467.00	465.00	470.00	9.79	NS
4 (wks)	1483.00	1489.00	1484.00	1489.00	1486.00	6.53	NS
6 (wks)	3445.00	3448.00	3454.00	3451.00	3447.00	8.6	NS
<b>Feed conversion (g feed/g gain)</b>							
2 (wks)	1.53	1.53	1.52	1.55	1.55	0.07	NS
4 (wks)	1.77	1.76	1.77	1.76	1.75	0.02	NS
6 (wks)	2.06	2.07	2.06	2.08	2.09	0.035	NS
Mortality (%)	3.01	3.02	3.00	3.03	3.05	0.04	NS
Economic Figure (EF)	184.88	184.63	185.67	183.23	181.94	6.22	NS

methionine in adequate quantities that required for poultry (Singh and Panda, 1990). As well as, it enhances the feed consumption and feed efficiency (Solangi *et al.*, 2002). These results were almost similar to the studies of Awoniyi *et al.*, 2003; Oduho *et al.*, 2005; Salih, 2009 who reported that fishmeal could be used at different levels up to 8% in broiler diets without adversely effecting weight gain, feed consumption and efficiency. There were no significant differences among treatments on Economic Figure (FE) and all over mortality. That may be due to fishmeal protect health, welfare and reduce the use of antibiotics and other drugs (Pike, 1999; Anonymous, 2002). Mortality recorded in this study were corresponding with the results found by Ponce and Gernat (2002); Salih (2009).

The chemical composition of meat is shown in Table 4 were significantly ( $p < 0.05$ ) effected by fish meal except ash and dry matter percentage. The percentage of protein was significantly ( $p < 0.05$ ) increased, while fat percentage was significantly ( $p < 0.05$ ) decreased with the increasing level of fish meal in the diet. This result may be due to the level of fat (1.8%, Table 1) in fish meal comparison with higher level of fat in protein concentration. As well as, there was inverse correlation between protein and fat (Khatoon *et al.*, 2006). The results approved by Ponce and Gernat (2002); Dobrzanski *et al.* (2003) who showed similar effects. The panel test of cooking meat (Thigh and Breast) which is shown in Table 5 declared that fishmeal has no significant effects on tenderness and juiciness. While

Table 4: Effect of using local fish meal (*Liza abu*) on chemical composition of carcass

Treatment	Dry matter (%)	CP (%)	C. Fat (%)	Ash (%)	Sig.
Control	29.42±0.3	16.01 <sup>b</sup> ±0.32	12.14 <sup>a</sup> ±0.20	1.01±0.04	0.05
25% Fishmeal	29.91±0.04	16.80 <sup>b</sup> ±0.07	12.10 <sup>b</sup> ±0.14	1.01±0.02	0.05
50% Fishmeal	29.53±0.32	17.21 <sup>b</sup> ±0.19	11.30 <sup>b</sup> ±0.21	1.02±0.02	0.05
75% Fishmeal	29.13±0.15	18.01 <sup>a</sup> ±0.20	10.43 <sup>c</sup> ±0.23	1.02±0.03	0.05
100% Fishmeal	29.44±0.12	18.22 <sup>a</sup> ±0.17	10.20 <sup>c</sup> ±0.08	1.02±0.02	0.05

Table 5: Effect of using local fish meal (*Liza abu*) on meat panel test

Treatment	Tenderness		Juiciness		Fish flavor		Sig.
	Thigh	Breast	Thigh	Breast	Thigh	Breast	
Control	1.86±0.09	2.55±0.13	2.47±0.01	2.76±0.11	1.66 <sup>b</sup> ±0.13	1.59 <sup>b</sup> ±0.17	0.05
25% Fishmeal	1.86±0.04	2.49±0.20	2.29±0.17	2.77±0.14	1.79 <sup>b</sup> ±0.17	1.67 <sup>b</sup> ±0.31	0.05
50% Fishmeal	1.98±0.02	2.60±0.07	2.53±0.09	2.86±0.11	2.01 <sup>b</sup> ±0.01	1.85 <sup>b</sup> ±0.06	0.05
75% Fishmeal	2.01±0.05	2.67±0.16	2.71±0.09	2.90±0.09	3.60 <sup>a</sup> ±0.14	2.76 <sup>a</sup> ±0.19	0.05
100% Fishmeal	2.01±0.06	2.77±0.16	2.85±0.11	2.98±0.02	3.83 <sup>a</sup> ±0.07	2.99 <sup>a</sup> ±0.01	0.05

fish flavor of groups fed 75 and 100% fish meal in comparison with control and other groups significantly ( $p<0.05$ ) increased. That increase may be due to oxidation of phospho lipids and amount of Thiobarbituric acid TBA (Dawson *et al.*, 1990). These results are partially agreed with Dobrzanski *et al.* (2003) and Salih (2009).

Finally, the fish meal with addition of vitamins and minerals to the diets can replace protein concentrate partially or totally. The elimination of fish meal from grower diets few days before the birds slaughtering to get rid of fish meal will not effect on the quality of meat.

## REFERENCES

- Anonymous, 2002. Fishmeal facts and figures Fishmeal information network (Fin). 2 College yard, lower Dognall street, St Albans. A13 APA U.K. Association official Analytical.
- Awoniyi, T.A.M., V.A. Aleto and J.M. Aina, 2003. Performance of broiler-chickens fed on maggot in place of fishmeal. *Int. J. Poult. Sci.*, 2: 271-274.
- AOAC, 1998. Official Methods of Analysis. 18th Edn., Association of official analytical chemists Washington DC., USA.
- Banerjee, G.C., 1992. Poultry 3rd Edn., Oxford and IBH publishing Co. Pvt. Ltd. New Delhi, Bombay. Calcutte.
- Dawson, P.L., B.W. Sheldon, D.K. Larick and H.R. Bali Jr., 1990. Changes in the phospho lipid and neutral-lipid fractions of mechanically deboned chicken meat due to washing cooking and storage. *Poult. Sci.*, 69: 166-175.
- Dobrzanski, Z., D. Jamorz, Z. Usydus and T. Trziszka, 2003. Effect of modified dietary fishmeal on broiler performance and meat quality. *Med. Vet. Lublin.*, 59: 702-705.
- Khatoun, S., N.Q. Hanif and N. Malk, 2006. Status of fishmeal available for poultry rations in Pakistan. *Pak. Vet. J.*, 26: 97-98.
- Leon, E., 1998. Alternative energy and protein sources of animal feed. at AFMAS Symposium on 15<sup>th</sup> October 1997.
- Lyon, B.G. and C.E. Lyon, 1990. Texture profile of broiler perctorails major as influenced by post mortem dehoning time and heat method. *Poult. Sci.*, 69: 329-340.
- Maigualema, M.A. and A.G. Gernet, 2003. The effect of feeding elevated levels of tilapia (*Oreochromis niloticus*) by-product meal on broiler performance and carcass characteristics. *Int. J. Poult. Sci.*, 2: 195-199.
- Naji, S.A.H., 2006. Commercial broiler production manual. Brochure No. (12). ( in Arabic).
- Oduho, G.W., D.H. Baker and J.K. Tuitok, 2005. Pelagic fishmeal *rastrineobola argentea* as protein source for broiler. *Agric. Tropica ET Subtropica*, 38(2).
- Pike, L.H., 1999. Health benefits from feeding fish oil and fishmeal: The role of long chain omega-3 polyunsaturated fatty acids in animal feeding. International Fishmeal and Oil Manufacturers Association, 2 College yard, Lower Dagnall Street, St. Albans, Herts: AL3 4PA, U.K. Technical Bulletin No. 38.
- Ponce, L.E. and A.G. Gernat, 2002. The effect of using different levels of tilapia by product meal in broiler diets. *Poult. Sci.*, 81: 1045-1049.
- Salih, G.E., 2009. Effects of inclusion of local disposed roasted fishmeal on the performance and carcass characteristics of broiler. *Egypt. Poult. Sci.*, 29: 735-745.
- Singh, K.S. and B. Panda, 1990. Legislation and quality control of feeds: The experience of Asian countries. In: Proceedings of the FAO expert consultation on the substitution of imported concentrate feeds in animal production systems in developing countries. FAO regional office for Asia and the pacific, Bangkok Thailand.
- SPSS, 1999. Statistical Package of Social Science. Ver. 11. Application Guide. Copy right by SPSS Inc. USA.
- Solangi, A.A., A. Memon, T.A. Qureshi, H.H. Leghari, G.M. Baloch and M.P. Wagan, 2002. Replacement of fishmeal by soybeen meal in broiler ration. *J. Anim. Vet. Adv.*, 1: 28-30.