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Performance of Broilers by Replacing Fish Meal with Broiler Offal at Different Ages

M.H. Hossain ,[1]M.S.A. Biswas, [2]A.J. Sikder, [3]A. K. Sarkar, [4]M.A.R. Howlider
Area manager, Danida Small Holder livestock Development Project, RDF, Kalapara
[1]Poultry Development Officer, Department of Livestock Service, Dhaka; [2]Upazila livestock officer, Kalapara, Department of livestock service, Dhaka; [3]Veterinary Surgeon, Department of Livestock Service; [4]Professor, Department of Poultry Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract: Commercial broiler production has become a specialized and speedy poultry operation during the recent years all over the world. A total of 144 day old straight run strabro broiler chicks were fed *ad libitum* up to 42 days of age on 3 different iso-nitrogenous and iso-energetic diets formed by replacing dietary fish meal (FM) by broiler offal (BO); T_1 (8% FM + 0% BO), T_2 (4% FM + 4% BO) and T_3 (0% FM + 8% BO) to have its effect on performance of broilers. The growth rate, feed intake, feed conversion, survivability and profitability increased almost linearly on increasing level of dietary BO. Replacing FM by BO did not affect survivability of broiler. As costly FM was replaced by cheaper BO on increasing dietary levels of BO, the performance and profitability were increased up to 8%. It was suggested to replace costly FM completely by cheaper BO in broiler diet leading for increased profitability provided easy and economic processing of BO could be practiced.

Key words: Fish meal, broiler offal, body weight, survivability

Introduction

Poultry meat contributes approximately 37% of the total animal protein supplied in the country (Ahmed and Islam, 1990). Commercial broiler production has become a specialized and speedy poultry operation during the recent years all over the world. The broiler industry demands a fast growing chicks and good quality feed with high level of energy protein, vitamins and essential minerals to support maximum growth before the birds are ready to sale. For the survivability of broiler industry, the production cost should be kept as minimum as possible. Cost of feed incurred about 60-65% of the total cost of poultry production (Singh, 1990 and Banerjee, 1992). Fishmeal is the conventional animal protein source and costly feed item in Bangladesh when added to the diet of poultry increase the poultry production cost (Islam, 1993) too much. Moreover, poultry is a competitor of human being in respect of dry fish consumption. So, the price of quality FM is increasing at an alarming rate and its quantitative supply is not steady in the local market throughout the year. In Bangladesh Broiler industry is growing rapidly and there is an increasing trend of dressed broiler consumption in some big cities. Broiler offal is a high quality animal protein. Therefore, broiler offal, a by-product of the broiler processing plant, is now available to be recycled as poultry feed. Broiler offal contained reasonable amounts of proximate components, essential amino acids and important minerals (Hossain *et al.*, 1989). It may be an important addition in the list of unconventional ingredients to be used for poultry to minimize feed cost. Therefore, the study was carried out with the following objectives:

To study the effect of replacing fishmeal partially or completely by broiler offal on the performance of broilers.
To assess the economic feasibility of feeding broiler offal to broilers.

Materials and Methods

The experiment was conducted at Bangladesh Agricultural University Poultry Farm, Mymensingh to a study the effect of replacing fishmeal by broiler offals in the diet of broilers. The experiments were conducted from day old to 42 days of age. The experimental rooms of the broiler house were properly washed and cleaned by using tap water and disinfected by using antiseptic phenyl solution followed by losan (solution). After drying the whole room was divided into 12 separate pens of equal size (120cm x 90cm) using wire net and bamboo materials. A total of 144 unsexed day old starbro broiler chicks were purchased from the Biman Poultry Complex, Ganakbari, Savar, Dhaka. The Original source of this starbro broiler strain was Shaver Breeding Farms Ltd., Canada.

Broiler offals collected from the Biman Poultry Complex, Ganakbari, Savar, Dhaka were cleaned with fresh water, boiled at 100°C for 10 to 15 minutes, chopped by chopping machine, sun-dried and ground by a feed grinder and stored in a plastic bag for 25 days (apron) before using in the diet. Chicks were equally and randomly divided and distributed in three dietary treatment groups (T_1, T_2 and T_3) having four replication in each. Each dietary treatment groups consists of 48 chicks distributed in four replicated pens (R_1, R_2, R_3 and R_4) with 12 chicks in each. The layout of the experiment is Table 1.

The following records on various variables were kept during the experimental period:

i. **Body Weight:** Initial and weekly body weight of the individual birds.
ii. **Feed Intake:** Weekly feed consumption according to treatment and replication
iii. **Mortality:** Mortality was recorded as and when death occurred.
iv. **Recording of Temperature and Relative Humidity:** Temperature (0°C) and relative humidity of the experimental house and pens during experimental period was recorded three times a day (6 a.m.-12 p.m., and 6 p.m.) with the help of dry and wet bulb hygrometer.

The data were tabulated, compiled, and analyzed with CRD to see the significant of the findings (Zaman *et al.*, 1982).

Results and Discussion

The live weights of the experimental birds were found significantly influenced by diets. The initial live weight of broilers was almost similar on all diets ($P>0.05$). Live weight at 14, 21, 28, 35 and 42 days of age were increased for increasing dietary BO level from 0 to 8%. Highest performance (1603g) on T_3 (0% FM + 8% BO) indicates that complete replacement of FM by BO is possible with increased growth performance of broilers. As FM with comparatively lower CP content was replaced by BO of higher CP concentration that might have increased animal protein proportion in diet improving biological value of protein. Increased broiler performance for using BO in lieu of FM is supported by Fraga *et al.* (1989). It was observed from the result in Table 3 that consumption significantly increased form replacing dietary FM by BO at all ages ($P<0.01$), except at 21 and 35 days of age where non-significant ($P<0.05$) differences were obtained. During the entire experimental period, birds had highest feed consumption on T_3 (8% BO + 0% FM), intermediate on T_2 (4% BO + 4% FM) and lowest (0% BO + 8% FM). At 7 days of age BO and FM levels no relation within feed conversion, but efficiency of feed conversion increased (Table 3) for increasing concentration of BO in diet at 14, 21, 28, 35 and 42 days of age ($P<0.01$). Improved feed utilization on diets noted is supported by Salmon (1977) who recorded better feed conversion for substitution of dietary FM by 7.5% herring meal and 1.5% bone meal in turkeys. Improved feed conversion of broiler of diets with increased BO level in current study also coincides with Dafwang *et al.* (1986). They reported improved feed conversion of broilers on BO diets.

No significant difference ($P<0.05$) in survivability was found which could be attributed either to dietary BO or FM levels (Table 3). In the present study, dietary levels of BO had no influence on survivability. Bulbul and Islam (1991) observed reduced mortality on diets when BO totally replaced FM in diet, but Mazanowski *et al.* (1982) found increased mortality from 2.8 to 3.5 and from 4.9 to 5.9% for increasing BO in diet. Cost in raising broilers on different dietary levels of BO and FM are shown in Table 4. Total production cost per broiler was almost similar on different levels of dietary BO ($P<0.05$). However, profit (Tk./ broiler and Tk./kg broiler were significantly higher ($P<0.01$) with increasing dietary BO and decreasing FM levels in diet. Reduced production cost and increasing profitability per broiler on increasing dietary levels of BO recorded in current study coincide with Bulbul and Islam (1991) and Nazneen T. (1995). They reported that broiler offal were more economic and gave lowest feed cost per kg broiler when BO replaced FM in diet. Result suggest that lower cost of BO (Tk.25/kg) compared to FM (Tk./30) could advantageously be used in formulating low cost and nutritionally well balanced diets for broilers with improved growth performance and profitability.

Table 1: Lay out of the experiment

Treatment group	Number of birds each replication				Total number of birds
	R_1	R_2	R_3	R_4	
T_1	12	12	12	12	48
T_2	12	12	12	12	48
T_3	12	12	12	12	48
Total					144

Table 2: The Proximate composition of FM and BO (Singh, R.A. 1996.)

Components	FM	BO
Crude protein (%)	58	60
Crude fibre (%)	1	2.5
Ether extract (%)	9	13
Calcium	7.7	3.6
Phosphorus	3	2.2
Metabolizable energy (Kcal/kg)	2770	2910

Table 3: Performance of broiler on different dietary of BO at different ages

Parameters	Age in days	Dietary levels of BO (%) 0(T_1)	4(T_2)	8(T_3)	Levels of Significance
Body weight (g/broiler)	Day old	44.994	45.06	45.12	NS
	7	112.9^{b}	113.6^{b}	129.4^{a}	*
	14	242.4^{c}	260.7^{b}	283.2^{a}	**
	21	432.5^{c}	472.9^{b}	522.0^{a}	**
	28	698.4^{c}	758.0^{b}	822.5^{a}	**
	35	950.0^{c}	1051.0^{b}	1137^{a}	**
	42	1316.0^{c}	1461.0^{b}	1603^{a}	**
Feed consumption (g/broiler)	7	110.0^{b}	112.5^{b}	142.1^{a}	*
	14	490.0^{b}	504.9^{b}	545.8^{a}	*
	21	701.3^{c}	1002.0	1035.0^{a}	NS
	28	1483.0^{c}	1578.0^{b}	1685.0^{a}	**
	35	2126.89	2021.90	2358.18	NS
	42	3114.0^{c}	3396.0^{b}	3628.0^{a}	**
Feed conversion ratio	7	1.60	1.64	1.69	NS
	14	2.48^{a}	2.34^{b}	2.29^{b}	**
	21	2.39^{a}	2.33^{a}	2.18^{b}	*
	28	2.27^{a}	2.21^{b}	2.17^{b}	*
	35	2.35^{a}	2.26^{ab}	2.17^{b}	*
	42	2.50^{a}	2.40^{b}	2.32^{c}	**
Survivability	7	95.83	100	100	NS
	14	100	97.92	100	NS
	21	100	100	95.83	NS
	28	100	97.92	100	NS
	35	97.92	100	95.83	NS
	42	100	100	100	NS

Table 4: Cost of production and profit of broiler on different diets where fishmeal (FM) was replaced by broiler offal (BO)

Parameter	Dietary broiler of BO 0	4	8	SED (LSD) and values significance
Live weight (g/broiler)	1316^{b}	1411^{b}	1616^{a}	149.81**
Feed cost	3992^{c}	41.72^{b}	43.69^{a}	2.41**
Chick cost	23.66	23.00	24.20	1.52^{NS}
Other cost	7.28	7.10	7.47	0.470^{NS}
Total cost	70.82	71.83	75.36	2.530^{NS}
Market price	94.72^{c}	105.2^{b}	116.3^{a}	4.649**
Profit (Tk./broiler)	23.92^{c}	33.35^{b}	40.98^{a}	10.890**
Profit (Tk./kg live broiler)	18.11^{b}	22.80^{a}	25.31^{a}	4.542*

#Other cost included vaccine, labor, disinfectants, electricity, water and transport cost etc.

♦Chick cost was calculated after adjustment of mortality.

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