Effect of Supplementation of Soybean Cake and Fishmeal with Lysine and Methionine in Broiler Diets on the Growth Performance of Turkey Poults

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ABSTRACT

The study was carried out during June to August 2003, using one hundred and eight day old turkey poults which were randomly divided into twelve groups, 9 birds in each. Three replicate were allocated to each four dietary treatments. Commercially available broiler feed (Ratna feed) was considered as basal diet (Diet-1), Diet-2 was prepared by addition of lysine (0.3%) + methionine (0.1%) to Diet-1, Diet-3 was prepared by supplementation of soybean cake (15%) + lysine (0.2%) + methionine (0.1%) to Diet-1and Diet-4 was formulated by addition of soybean cake (10%) + fishmeal (5%) in Diet-1. Each diet was offered ad lib. from one week to 10 weeks of age. Observation on weekly body weight, weekly and cumulative feed consumed was accessed. Weekly body weight gain and feed conversion ratio was calculated. Economics of dietary treatments in terms of income over chicks and feed cost was also calculated. Significantly higher body weight ($P < 0.01$) was observed in birds fed with Diet-3 (1881.5 ± 17 g), followed by Diet-4 (1745.3 ± 33 g) and Diet-2 (1460.8 ± 51 g) as compared to Diet-1 (1125.2 ± 20 g) up to 10 weeks of age. The birds fed with supplemented diet consumed significantly ($P < 0.01$) higher feed than that of basal diet. The average additional profit per bird fed with supplemented diets over basal diet was found to be Rs 31.21, Rs 29.4 and Rs 9.92 for Diet-3, followed by Diet-4 and Diet-2, respectively. The results showed that supplemented diets were more economical than that of basal diet. It may be concluded that supplementation of either soybean cake (15%) along with lysine (0.2%) and methionine (0.1%) or soybean cake (10%) and fishmeal (5%) in commercial broiler ration could be beneficial for enhancing higher body weight of turkey poults and resulted higher gross income as compared to basal diet (broiler ration).

Key words: Fishmeal, lysine, methionine, soybean cake, turkey

INTRODUCTION

Turkey is an important poultry species reared for meat production. In Nepal, Turkey was introduced on January 2001 for research with an aim to diversify meat production from different avian species. In Nepal, this bird is not fully exploited commercially; hence the balance feed formulated for turkey is not available commercially. Although the feed ingredients for rations formulation are the same as chicken, the feed requirement differs from those of chicken. However, experienced farmers may easily prepared turkey feed either self or in consultation with poultry nutritionists. Tyagi (2001) suggested that turkey diet needs a narrower energy to protein ratio as compared to chicken diet. Bhanja and Majumdar (2001) and Sell et al (1994) reported that turkey need high protein diet at early stage i.e. 28% protein and 2800 Kcal ME with lysine (1.6%) and methionine (0.55%) up to 4 weeks of age, 25% protein and 2900 Kcal ME with lysine (1.5%) and methionine (0.45%) for 5-8 weeks, 22% protein with 3000 Kcal ME for 9-12 weeks and then slowly the protein content is decreased and dietary metabolic energy is increased with age. Karki (2004) observed in Parwanipur Nepal that poor feed efficiency was associated in turkey poults fed in broilers diet as compared to standard formulated diet ie 28% protein with 2800 Kcal ME up to 5 weeks and 24% protein with 2900 Kcal ME for 6-10 weeks. This indicated that commercially available broiler ration may not able to sustain rapid growth of turkey particularly at early age due to having low protein contain and have a wider energy to protein ratio along with lower percent of lysine and methionine. In general commercial broiler starter ration have 23% protein and 2900 Kcal ME with

lysine (1.22%) and methionine (0.83%) (Panda et al 1997). Sell et al (1994) reported that reduced level of protein can decrease early growth in turkey. Protein requirements of turkey poults could be reduced by supplementation with lysine, methionine and theronine (Waibel et al 2000). He further addressed that lysine and methionine are first and second limiting amino acid in soybean-corn meal diets for turkey. Presently balance feed of turkey is not commercially available, in this context improving the quality of broiler feed by addition of protein containing ingredients like soybean cake and fishmeal with lysine and methionine could be the possible alternative to achieve rapid growth of turkey poults. So, this experiment was conducted to find out the growth performance of turkey poults on broiler diet supplementing with soybean cake, fishmeal with lysine and methionine.

MATERIALS AND METHODS

The study was conducted at Poultry Research Unit of Regional Agricultural Research Station, Parwanipur during June 2003 to August 2003. The study comprised of a day old one hundred and eight turkey poults which were randomly divided into twelve groups. Nine birds were allocated to each group. Three replicate groups were allotted to each four dietary treatments. Commercial available broiler feed (Ratna feed) was considered as basal diet (Diet-1), Diet-2 was prepared by addition of lysine (0.3%) + methionine (0.1%) to Diet-1, Diet-3 was prepared by supplementation of soybean cake (15%) + lysine (0.2%) + methionine (0.1%) to Diet-1 and Diet-4 was formulated by addition of soybean cake (10%) + fishmeal (5%) in Diet-1. Each diet was offered ad lib. from one week to 10 weeks of age. Adequate fresh water and uniform standard management were provided to all the birds throughout the experimental period. Observation on weekly body weight, weekly and cumulative feed consumed was accessed. Weekly and cumulative body weight gain and feed conversion ratio was calculated. The data were analyzed statistically by using MSTAT-C statistical package. Economics of dietary treatments was also calculated.

RESULTS AND DISCUSSION

Body weight gain

The mean weekly body weights of turkey poults fed with four different dietary levels from 1 to 10 weeks of age is presented in Table 1. Table clearly showed that supplemented diet have significantly positive influence on weekly body weight gain ($P < 0.01$). Average body weight of 1881.5 ± 17 g, 1745.3 ± 33 g, 1460.8 ± 51 g and 1125.2 ± 20 g was observed in birds fed with Diet-3, followed by Diet-4, Diet-2 and Diet-1, respectively. The body weight recorded in this trial are lower as compared to the reported by Karki (2004) who recorded 2.225 kg with the ration containing 28% protein and 2800 Kcal ME as starter, and 24% protein with 2900 Kcal ME up to 10 weeks of age. Similarly, average body weight of 5.2 kg (Sell et al 1994) and 3.17 kg (Panda et al 1997) was recorded at 10 weeks of age in large-type turkey. Lowered body weight of turkey recorded in this experiment might be due to the result of small variety, lack of standard ration and inadequate housing management.

Table 1. Weekly body weight (average ± SE) of turkey poults fed with four dietary treatments, g

Diets	1week	2 week	3 week	4 week	5 week	6 week	7 week	8 week	9 week	10 week
1	92.97 ± 0.81	131.63 ± 0.54	203.43^{c} ± 1.02	276.2^{c} ± 3.13	379.04^{c} ± 11.73	499.5^{c} ± 15.53	610.71^{c} ± 10.31	757.15^{d} ± 22.96	908.33^{d} ± 6.29	1125.2^{d} ± 20.89
2	97.53 ± 1.51	137.03 ± 2.75	218.10^{b} ± 2.63	310.5^{b} ± 5.29	459.52^{b} ± 9.56	641.9^{b} ± 13.66	804.77^{b} ± 7.25	1005.9^{c} ± 14.63	1199.8^{c} ± 9.13	1460.8^{c} ± 51.16
3	93.67 ± 2.55	141.67 ± 2.87	249.13^{a} ± 4.71	369.4^{a} ± 5.51	547.54^{a} ± 11.89	766.9^{a} ± 21.66	1009.5^{a} ± 20.24	1284.7^{a} ± 37.6	1528.2^{a} ± 44.28	1881.5^{a} ± 17.09
4	95.8 ± 2.68	141.37 ± 3.15	240.47^{a} ± 5.29	367.1^{a} ± 1.1	530.64^{a} ± 14.08	763.9^{a} ±	967.86^{a} ± 25.75	1191.6^{b} ± 28.89	1446.4^{b} ± 14.43	1745.3^{b} ± 33.08

						15.35				
P-value	0.2545	0.1258	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LSD (0.05)	6.35	9.59	13.68	13.69	32.19	48	52.68	79.76	3.09	128.83

Means bearing different superscripts in same column different significantly.

Table 2. Weekly net weight gain (average) of turkeys poults fed with four dietary treatments, g

Diets	2 week	3 week	4 week	5 week	6 week	7 week	8 week	9 week	10 week
1	39.7	71.81	72.76	102.87	120.48	111.08	146.44	151.18	216.91
	(43.2)†	(54.55)	(35.78)	(37.24)	(31.78)	(22.23)	(23.92)	(19.97)	(23.87)
2	39.4	81.06	92.38	149.06	182.38	162.86	201.19	193.81	261.07
	(40.41)	(59.15)	(42.34)	(48.01)	(39.79)	(25.37)	(24.99)	(19.27)	(21.71)
3	48	107.43	120.27	178.2	218.7	242.62	275.19	243.45	353.33
	(51.38)	(75.83)	(48.29)	(48.24)	(40.02)	(31.64)	(27.23)	(18.95)	(23.26)
4	45.6	99.08	116.67	173.37	233.41	203.97	223.81	254.76	298.84
	(47.85)	(70.08)	(48.49)	(47.23)	(44.06)	(26.7)	(23.14)	(21.38)	(20.64)
P-value	0.2169	0.0000	0.0000	0.0006	0.0012	0.0038	0.0017	0.0047	0.1025
LSD (0.05)	10.55	6.57	5.36	22.16	37.10	51.49	41.89	45.5	111.22

† *Relative growth rate percentages are given in parenthesis.*

Weekly net weight gain

The Table 2 revealed a significant difference ($P < 0.01$) among the four dietary treatments for weekly weight gain of turkey poults for all weeks except 2nd and 10th weeks of age. Higher relative growth rate percentage was observed in birds fed with Diet-3 and Diet-4 than that of Diet-1 and Diet-2, which was mainly distinct during 3rd weeks of age.

Feed consumption

The weekly and cumulative feed consumption of turkey poults are given in Table 3. The Table clearly indicated that the dietary treatment have significant influence on feed consumption ($P < 0.01$) with the birds fed with supplemented diet exhibiting more feed intake than that of basal diet. Cumulative feed consumption was found to be higher in Diet-3 (5562 g), followed by Diet-4 (5296 g), which were significantly higher ($P < 0.01$) than others treatment but non significant difference was exist to each other. The data observed in this experiment was lower than that of reported by Karki (2004), Panda et al (1997) and Sell et al (1994) who reported 6.33 kg, 6.8 kg and 9.37 kg feed, respectively. It is reported that an inverse relationship exists between the ME concentration of the diet and feed consumption of turkeys (Sell et al 1994). Turkey diet needs a narrower energy to protein ratio as compared to chicken diet. Lowered feed intake of turkey birds fed with Diet-1 and Diet-2 in this experiment might be due to the cause of wider energy to protein ratio.

Table 3. Weekly and cumulative feed intake (average, SE) of turkeys poults, g

Diets	2 week	3 week	4 week	5 week	6 week	7 week	8 week	9 week	10 week	Cumulative
1	156.9	231.3b†	274b	289b	339.3c	323.6c	472.5c	527.1c	634.62c	3248c
	± 1.77	± 7.14	± 13.7	± 22.4	± 3.34	± 23.4	± 17.2	± 30.9	± 14.83	± 112
2	160.6	269.7a	369.5a	365.1a	474.1b	525b	612b	708.9b	897.17b	4382b
	± 4.67	± 3.02	± 13.6	± 6.49	± 2.51	± 25.8	± 21.6	± 25.7	± 48.09	± 122
3	167.9	289.9a	387.6a	409.7a	533.9a	711.3a	884.2a	962.5a	1214.9a	5562a
	± 2.05	± 14.6	± 17.1	± 27.48	± 23.9	± 37.9	± 42.61	± 31.5	± 25.27	± 199
4	165.3	275.2a	403.8a	404.1a	563.6a	687.4a	796.8a	887.7a	1111.6a	5296a
	± 4.67	± 2.07	± 12.5	± 10.52	± 23.8	± 30.01	± 36.7	± 40.5	± 44.15	± 169
P-value	0.213	0.0068	0.0024	0.0137	0.0001	0.0003	0.0001	0.0002	0.0002	0.0001
LSD (0.05)	11.85	25.58	48.73	65.8	48.96	99.53	93.52	105.14	134.77	510.95

† *Means bearing different alphabet in the same column differs significantly.*

Table 4. Weekly and cumulative feed conversion ratio

Diets	2 week	3 week	4 week	5 week	6 week	7 week	8week	9 week	10 week	Cumulative
1	3.96	3.22a	3.76ab	2.82a	2.82	2.93	4.593	3.607	2.97	3.144

2		4.08	3.33a	4.01a	2.46b	2.633	3.307	3.043	3.673	3.557	3.218
3		3.48	2.69b	3.22c	2.29b	2.44	2.93	3.227	4.013	3.503	3.11
4		3.68	2.78b	3.48bc	2.33b	2.42	3.373	3.557	3.857	3.737	3.21
P-value		0.2158	0.007	0.0238	0.0075	0.3605	0.3292	0.4744	0.8527	0.4547	0.596
LSD (0.05)		0.667	0.323	0.456	0.25	0.572	0.695	2.459	1.251	1.142	0.218

Means bearing different alphabet in a column differ significantly.

Feed conservation ratio (FCR)

The weekly and cumulative feed conservation ratio of turkey poults assign to four dietary treatments are presented in Table 4. The data indicated that Diet-3 and Diet-4 have significantly better ($P < 0.01$) FCR than that of Diet-1 and Diet-2 at 3rd weeks of age. Similarly, better FCR was observed in Diet-3 followed by Diet-4 at 4th weeks and significantly poor feed efficiency ($P < 0.01$) was associated in basal diet as compared to others during 5th weeks of age. However, non significant difference among four dietary treatments was observed for weekly FCR during 6th to 10th weeks of age. At 9th and 10th weeks of age slightly better weekly feed efficiency was recorded in birds of basal diet that might be due to lower feed consumed of the birds as compared to supplemented diet. This reflected the possibility of using broiler diet to turkey poults after 8th weeks of age. Though, non significant difference was observed among the different dietary levels for cumulative FCR, lower value was found in Diet-3 (3.11), followed by Diet-1 (3.14), Diet-4 (3.21) and Diet-2 (3.22); which all are higher than reported by Karki (2004) ie 2.98 and Panda et al. (1997) ie 2.2. Similarly, Osti (2002) observed higher body weight gain, better feed efficiency, better feed consumption and higher gross income per bird of quail fed on layer starter ration supplemented with 5% fishmeal with 0.25% lysine and 0.125% methionine than that of basal ration.

Mortality

During entire experimental period, higher mortality was observed in Diet-1 (7.4%), followed by Diet-3 (3.7%) but no mortality was observed in other treatments. After 5 weeks of age lameness was observed in birds fed with Diet-1 (26.85%) and Diet-2 (14.81%), which was recovered by liquid feed supplementation. Incrustation in the corner of mouthparts was also appeared in birds of Diet-1 and Diet-2, which was disappeared with advancement of age by feeding of liquid multivitamins. Similar problems were also observed in turkey poults reared under farmers' ordinary feed and management condition (personal experience). The appearance of lameness and incrustation might be due to lack of adequate balance nutrition required for sustaining rapid growth of turkey.

Table 5. Economics of different feed treatments of Turkey rearing up to 10 weeks age

SN	Parameter	Diet-1	Diet-2	Diet-3	Diet-4
1	Initial cost of bird, Rs	40	40	40	40
2	Selling price of bird, Rs/kg live weight	110	110	110	110
3	Price of feed, Rs/kg	17	18.9	19.04	17.87
4	Feed consumed per bird, kg	3.284	4.382	5.562	5.296
5	Total feed cost per bird, Rs	55.83	82.82	107.8	94.63
6	Final weight per bird (up to 10 weeks of age), kg	1.125	1.461	1.882	1.745
7	Selling income per bird, Rs	123.75	160.71	207.02	191.97
8	Average profit per bird over chicks and feed cost, Rs	27.95	37.87	59.16	57.35
9	Additional profit per bird of supplemented diets over Diet-1		Rs 9.92	Rs 31.21	Rs 29.4

Economics of feeding

The detail of economics of four dietary treatments for turkey rearing up to 10 weeks of age is given in Table-5. The table clearly revealed that higher net income over feed and chicks cost was found in bird fed with Diet-3 (Rs 59.16), followed by Diet-4 (Rs 57.35) and Diet-2 (Rs 37.87) than that of birds reared on basal diet (Rs 27.95). The net income obtained in this experiment was lower than reported by Karki (2004). Similarly the average additional profit per bird fed with supplemented diets over basal diet was found to be Rs 31.21, Rs 29.4 and Rs 9.92 for Diet-3, followed by Diet-4 and Diet-2, respectively. The results showed that supplemented diets were more economical than that of basal diet.

The experiment clearly indicated that supplementation of either soybean cake (15%) along with lysine (0.2%) and methionine (0.1%) or soybean cake (10%) and fishmeal (5%) in commercial broiler ration could be beneficial for enhancing higher body weight of turkey poults up to 10 weeks of rearing and resulted higher gross income as compared to basal diet (broiler ration). As no published report on this aspect is appear to available, it is obligatory to verify the results through conducting comprehensive experimentations in future.

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