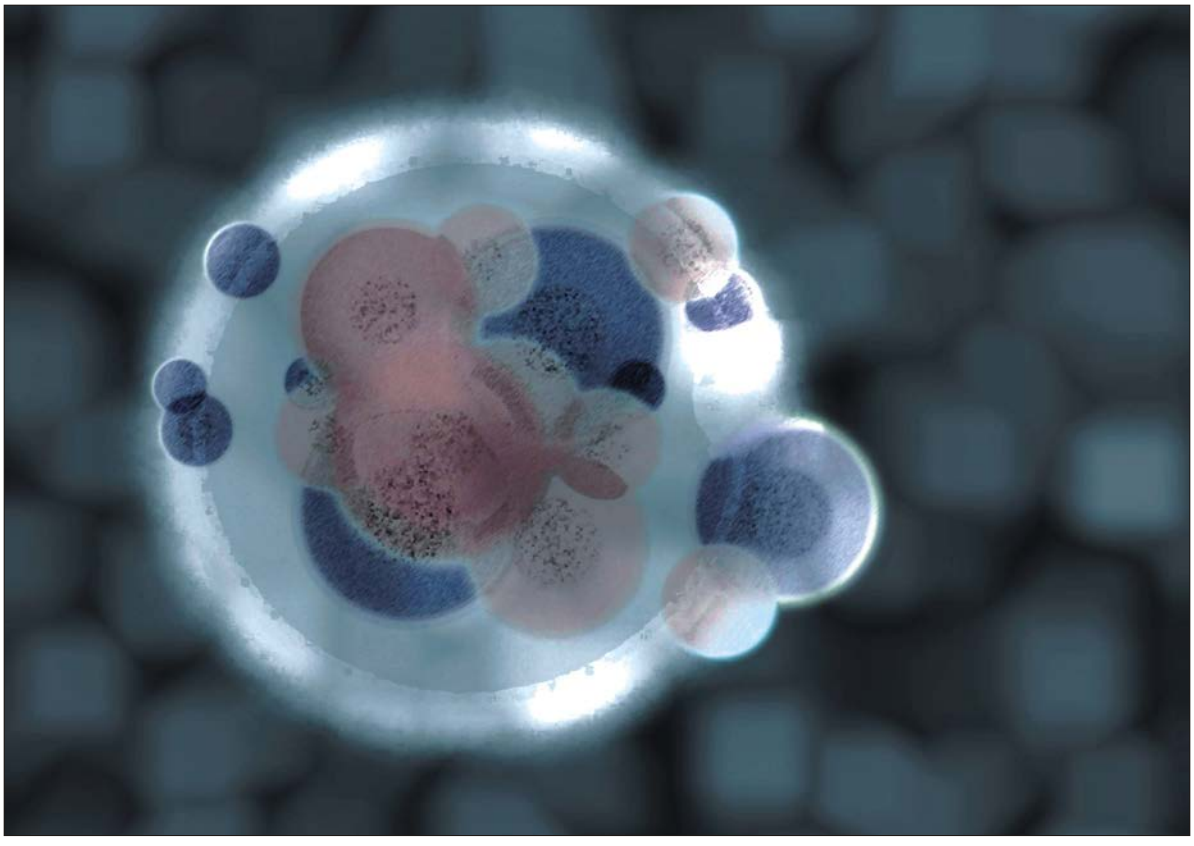

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Replacement of Sesame Oil Meal by Coconut Oil Meal in Diets with or Without Fish Meal on the Performance of Laying Hen

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Abstract: 56 star cross brown-579 commercial layers of 43 weeks of age were taken into experiment and grouped into 4. It was found that D_4 (20% coconut oil meal + 12.5% soybean oil meal) consumed highest feed (126.5 g/d) than D_1 (125.1 g/d), D_3 (124.2 g/d) and D_2 (123.3 g/d). The hen lay egg production of D_1, D_2 and D_3 dietary groups almost similar but of D_4 was higher. The higher egg weight (64.4 g/egg) was observed in D_2 dietary group and lowest in D_4 group (61.5). The D_4 dietary group showed lower feed efficiency (2.61) than D_1 (2.6), D_3 (2.57) and D_2 (2.52) non-significantly. The live weight gain of the D_2 and D_1 dietary groups were non-significantly higher than those fed on D_3 and D_4 diets. The feed cost was lower for per kg egg production by the D_4 (Tk. 23.01) dietary group due to the use of low cost (COM and SOM) vegetable protein based diet but there was no significant differences among the dietary groups. So there is economic feasibility of feeding the coconut oil meal with or without fish meal in layer diets.

Key words: Replacement, sesame oil meal, coconut oil meal, fish meal, laying hen

Introduction

Feed cost is the greatest expenditure in the production of egg. Profitability of poultry enterprise is dependent largely on the extent to which feed cost could be reduced. To increase the number of poultry feed ingredients and to reduce the feed cost many important unconventional feed ingredients may be included as dietary constituents of poultry feed. Poultry nutritionist are trying to identify locally available new or alternative source of ingredients for poultry to make diet more economic but qualitative. Different oil cakes being good sources of vegetable protein are produced abundantly in Bangladesh. Recently, sesame oil meal, a by-product of the oil is being considered as an ingredient for poultry feed formulation.

Coconut oil meal which is available in local market also contains all amino acids to some extent required for poultry. 40% level of coconut oil meal could be used very successfully for both broilers and layers as long as the amino acids were balanced by addition of methionine and lysine; and fat 15-20% coconut oil meal may be used in the ration of growing chicks as protein supplement (Fronda and Mallonga, 1985) and 20-25% for laying hen (Soldevila and Rojas-Daporta, 1978). Thomas and Scott (1962) reported that no growth depressing and toxic effect from coconut oil meal. Coconut oil meal used in poultry diets to minimize feed cost and converted into egg, meat etc. The project was undertaken to see the effect of diets containing coconut oil meal as substitute of sesame oil meal with or without fish meal on the performance of laying hen and to asses the economic feasibility of feeding coconut oil meal with or without fish meal in layer diets.

Materials and Methods

Birds and diets: 56 commercial layers "star cross Brown-579" were selected randomly from a population of 400 birds at the age of 43 weeks. The birds were divided into 4 dietary groups with 14 layers in each group. Body weight of birds was adjusted in all treatment groups at the beginning of the experiment. They were supplied with 4 diets D_1 with 20% sesame oil meal (SOM) + 8% fish meal (FM), D_2 with 20% coconut oil meal (COM) +10% FM, D_3 with 20% SeOM+10.% Soyabean oil meal (SOM), D_4 with 20% COM +12.5% SOM, so that each group received any one diet. All mash dry feed was supplied to the experimental birds *ad labium*. The detail composition of the diets are shown in Table 1. All diets were made Iso-nitrogenous and Iso-caloric in composition and the nutrients were almost similar closely to those suggested in 'star corss-579' commercial management guide. The body weight of laying hen of each group was recorded individually at the beginning of the experiment and at 2 weeks interval until the termination of the experiment. Feed consumption was recorded weekly and egg production was recorded daily.

Analytical methods and design of experiment: Proximate components of the representative samples of feed were determined following the methods of AOAC (1990) (Table 2). Starch content of coconut oil meal was determined by the method. Free sugar was estimated by calorimetric method (Dubois *et al*., 1951) The design of experiment was followed the Completely Randomized Design (CRD) (Steel and Torrie, 1980). Duncan Multiple Range Test (Duncan, 1955) was performed to identify the difference between mean values.

Results and Discussion

The effect of replacing sesame oil cake by coconut oil meal at 20% inclusion level in the presence or absence of fish meal on the productive performance of laying hens is shown in Table 3. Live weight gain of D_2 and D_1 dietary groups of birds during 18 weeks (43-60 weeks) of experimental period was higher than those birds fed on D_3 and D_4 diets (Table 3). The birds fed on D_2 diet gain weight slightly higher than the birds fed on D_1 diet.

However the differences in the mean values of body weight gain among different groups were not statistically significant although the mean values for D_4 group was considerably lower than those of 3 groups. The reason could be the high SEM. The highest feed consumption (126.5 g/d) was observed in D_4 and it was probably due to more palatability of the ration. Though the feed consumption was high in D_4 dietary group but difference in the mean value of feed consumption among different groups were not statistically significant.

The hen-day egg production of D_1, D_2 and D_3 dietary groups were almost similar but of D_4 was higher than the other 3 dietary groups. This result agreed well with the previous report that fed coconut oil meal without fish meal in different dietary levels to laying hens and found highest egg production (72.9%) with the dietary groups containing 20% coconut oil meal. but the result of present study differed with the findings that economic egg production (62.8%) in laying hen by feeding 20% COM with 10% FM. supplemented with vitamin-mineral premix. The hen-day egg production was not

Table 1: Composition of experimental diets (Amount in kg/ 100kg)

Feed ingredients	D_1	D_2	D_3	D_4
	20% sesame oil meal + 8% fish meal	20% coconut oil meal + 10% fish meal	20% sesame oil meal + 10% soyabean oil meal	20% coconut meal + 12.5% soyabean oil meal
Maize	47	50	49	48.5
Rice polish	15.5	11	12	11
Sesame oil meal	20	-	20	-
Coconut oil meal	-	20	-	20
Fish meal	8	10	-	-
Soyabean oil meal	-	-	10	12.5
Bone meal	2.75	2.75	2.75	1.75
Oyster shell	6.5	6	6	6
Common salt	0.25	0.25	0.25	0.25
Vitamin mineral premix	+	+	+	+
Calculated composition				
ME (MJ/kg)	11.43	11.33	11.52	11.43
Crude protein	17.17	16.26	17.40	16.95
Crude fibre	2.608	3.925	3.098	4.597
Calcium %	3.32	3.30	3.01	2.84
Available P%	0.60	0.65	0.48	0.40
Lysine %	0.61	0.48	0.73	0.66
Methionine %	0.62	0.45	0.46	0.26
Methionine + Cystein %	0.94	0.92	1.25	0.90
Tryptophen%	0.22	0.13	0.25	0.17

Table 2: Chemical composition of feed ingredients used for formulation of experimental diets and their cost

Ingredients	DM%	ME (kcal/kg)	CP%	EE%	CF%	Ca%	AP%	Lys%	Meth%	Cyst%	Tryp%	price (Tk/ kg)	(Tk/kg)
Maize	89.5	33.09[b]	9.3	3.5	2.2	0.02[b]	0.10[b]	0.20[b]	0.18[b]	0.18[b]	o.16[a]	9.00	
Rice polish	88.15	2900[b]	16.95	11.98	3.5	0.04[b]	0.16[b]	0.71[b]	0.27[b]	0.37[b]	0.13[a]	7.60	
Sesame oil meal	94.39	2600[b]	31.90	5.00	5.00	2.00[b]	0.30[b]	1.30[b]	1.40[b]	0.60[b]	0.69[b]	8.50	
Coconut oil meal	90.89*	2370*	25.10*	11.88*	12.00*	0.20[b]	0.20[b]	2.60[b]	0.30[b]	0.61[b]	0.22[d]	4.20	
Fish meal	90.38	2650[b]	48.0	1.00	0.40	3.80[b]	0.50[b]	1.80[b]	2.70[b]	0.80[b]	0.35[d]	22.50	
Soyabean oil meal	90.90	2694[d]	45.0	0.90	6.00	0.32	0.25	2.90	0.65	0.67	0.57[d]	14.20	
Bone meal	97.00	-	-	-	-	29[c]	13.3[c]	-	-	-	-	9.00	
Oyster shell	99.00	-	-	-	-	37[b]	.015[b]	-	-	-	-	6.00	

DM, CP, EE and CF values are based on laboratory analysis
The values are based on laboratory analysis in Poultry Science Department in BAU.

Table 3: Performance of laying hens fed COM containing diets with or without fish meal (43-60 weeks)

Variables	Diets				
	D_1	D_2	D_3	D_4	
	20% sesame oil meal + 8% fish meal	20% coconut oil meal + 10% fish meal	20% sesame oil meal + 10% soyaben oil meal	20% coconut meal + 12 % soyabean oil meal	level of significance
Initial body weight (g/bird)	1929.2	1916.8	1961.4	1968.3	NS
Final body weight (g/bird)	1994.6	1984.1	2009.9	1979.8	NS
Weight gain (g/bird)	65.4	67.3	48.5	11.5	NS
Feed consumption (g/bird/day)	125.1	123.3	124.2	126.5	NS
Hen-day egg production (%)	76.6	77.8	76.6	80.1	NS
Egg weight (g/egg)	62.7[b]	64.4[a]	63.1[b]	61.5[c]	*
Feed efficiency	2.6	2.52	2.57	2.61	NS
Egg mass output (g/bird/day)	48.1	50.8	48.9	50.2	NS
Livability %	95	100	100	100	-
Feed cost/kg mixed feed (Tk.)	10.07	9.92	9.58	8.85	-
Feed cost/ kg egg production (Tk.)	26.22	24.00	24.62	23.01	NS

abc meanes bearing dissimilar superscripts differ significantly. NS = Non significant. * = $p<0.01$

statistically significant among the groups.
The highest egg weight (64.4 g/d) was observed in D_2 dietary group. The difference in egg weight between D_1 and D_3 was statistically non significant but both these groups differed significantly ($p<0.01$) from that of D_2. This variation was completely due to fully replacement of SeOM by COM. It might be due to higher CF (12.00%), and EE (11.88%) value of COM than CF (5.0%) and EE (5.0%) value of SeOM and it also might be due to higher digestion and absorption of CP of COM than that of SeOM. Normally EE supplies (2.25 times)

more energy than CP or starch. D_4 dietary group also showed significantly lower ($p<0.01$) egg weight than other 3 treatment groups. This might be due to fully absence of fish meal The feed conversion ratio (FCR) of experimental birds of different dietary groups from Table 3 is clear that the D_4 (2.61) dietary group showed lower feed efficiency due to lower egg weight and highest feed consumption but the different dietary group showed no statistically significant. Gerpacio *et al*. (1985) and Soldevila and Rajas-Daporta (1978) observed similar result in their experiment.

The calculated egg mass output of different dietary groups were close to each other. though slightly lower egg mass output was observed in D_1 and in D_3 but there is no significant differences among the four dietary groups. The result indicated that inclusion of COM up-to 20% level in poultry diets in presence or in absence of fishmeal had no deleterious effect on egg mass output. The feed cost per kg egg production by the birds of the treatment group D_4 (Tk. 23.01) was lower but the result of different dietary groups was not statistically significant. However when 20% SeOM was completely replaced by COM and FM was added the feed, cost of feed was reduced at Tk. 2.22 per kg egg production; This might be due to the low cost of COM than that of SeOM, where as in vegetables protein based diet D_4; without animal protein feed cost was reduced at Tk. 3.37 per kg egg production. This might be due to the low cost of COM and SOM than that of SeOM and FM Respectively. This low cost of dietary group D_4 was due to completely used of low cost (COM and SOM) vegetable protein based diet. This result agreed with the previous study of Aletor *et al*. (1991). It may be concluded that considering the low cost, availability and purity of protein supplement to the poultry ration, vegetable oil meal (20% COM) may be used as protein supplement in ration. Without any detrimental effect on the productive performance of laying hen except that egg weight depresses significantly when fish meal is not included and it is possible to make economic ration by using COM up-to 20% of the diet.

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