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MUSTARD SEED MEAL IN LAYER'S FEED*

F.H. Shah, Zia-ur-Rehman and Akhlaq Ahmed Malik

PCSIR Laboratories, Lahore 16, Pakistan

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Enzymatically detoxified mustard seed meal (DMSM) was used as a substitute for sesame-seed cake, blood, or fish meal or decorticated cotton seed meal in layer's rations. The results showed that 100% sesame seed cake, 33% blood and 33% fish meal or 100% decorticated cotton seed cake could be replaced by DMSM in layer's ration. No deterioration in egg quality and production was observed.

INTRODUCTION

The meal, left after oil extraction, from mustard and rape seeds contains 32–44%, crude protein of high biological value[1], but the presence of glucosinolates[2] renders it unfit for poultry and monogastric animals[3]. Removal of glucosinolates from the meal can convert it into good quality protein for poultry and animal consumption. Faungauf and Haensel [4] showed that up to 10 % of the rape-seed meal could be used in layer's ration. Similar results were obtained by O'Neil [5]. Shah *et al.* [6] reported detoxification of mustard seed cake by endogenous enzymes and incorporated detoxified meal in broiler ration. Improvement in feed conversion and dressing percentage of the broilers was reported when 100 % sesame meal, 33 % fish meal and 33 % blood meals were replaced by enzyme detoxified mustard seed meal (DMSM). The present study was conducted on layers.

MATERIAL AND METHOD

100 day old vaccinated layer chicks were purchased from PIA Shaver hatchery. They were reared on floor with deep litter system. Adequate heat for brooding was provided. All the birds were given starter and grower's mash based on DMSM and water, ad-libitum and reared up to 18 weeks under a phase feeding and lighting programme (Table 1). The pullets were then randomly divided into six groups of 12 each (three replicates of 4 birds) in specially designed (2½′ x 2½′ x 1¼′) colony laying cages, each equipped with feeding and water troughs. After 18 weeks, light was increased by half an hour per week to a constant of 17 hr a day. When in 30 % production, the hens were given a control layers mash containing DMSM up to 24 weeks of age. The birds were then introduced to the six isonitrogenous experimental rations based on DMSM (Table 2). These were all formulated to contain approximately equal amounts of essential amino acids. All the feed ingredients were purchased from the local market except detoxified mustard seed meal (DMSM) which was prepared in these laboratories. Individual ingredients and the prepared rations were analysed for crude protein, crude fibre and total ash content following A.O.A.C. methods (7). Volatile allyliosthiocyanate was estimated as reported by Nakaya et al. [2].

Feeding Trials: The experiment was started when the hens were 28 weeks old. Egg production was recorded daily, all the eggs laid on 2 days per week were weighed individually and the feed consumption was recorded on fortnightly basis. These observations were continued for 17 weeks. From the amount of feed consumed and the total number of eggs laid, the feed consumed per dozen eggs was calculated. The contents of eggs were analysed for crude protein moisture and total ash using the methods outlined in A.O.A.C. [7]. After the termination of the experiment, 2 birds from each group were subjected to post mortem examination.

The results obtained from the experiment were subjected to the analysis of variance to test the significance of the mean differences among the rations followed by Duncan's Multiple Range test [8].

RESULTS AND DISCUSSION

Average egg production per 100 birds per day of hens fed on different experimental rations varied from 47.20 to 72.06. (Table 3).

It is evident that rations B and C gave significantly better egg production than other rations and showed non-significant difference in egg production with the control ration A. However, the difference in egg production between other rations (D, E and F) was non-significant.

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Table 1. Phase feeding and lighting programme.

Description	O – 8 Weeks			9 – 18 Weeks			19 – 21 Weeks		
	1	2	3	1	2	3	1	2	3
Protein %	21.2	21.6	22.0	17.5	17.9	18.3	16.4	16.8	17.2
Metabolizable energy Kcal/kg	2600	2527	2366	2844	2684	2524	2800	2645	2450
Lysine %	1.08	1.09	1.11	0.83	0.85	0.85	0.79	0.80	0.82
Methionine + cystine %	0.76	0.78	0.68	0.68	0.68	0.70	0.66	0.67	0.68
Lighting hours (natural + artificial)	23	8	8	8	8	8	8.30	9.0	9.30

Table 2. Composition of experimental rations.

Sr. No.	Ingredients	Ration-A Control kg	Ration-B 100 % sesame meal replaced by DMSM kg	Ration-C 33 % fish and 33 % blood replaced by DMSM kg	Ration-D 33 % fish, 33 % blood and 100 % sesame replaced by DMSM kg	Ration-E 100 % sesame replaced by decorticated cotton seed meal kg	Ration-F 100 % Decorticated cotton seed meal replaced by DMSM kg	Price per lb. of ingredients (Rs)
1	2	3	4	5	6	7	8	9
1.	Maize	40	40	40	40	40	40	0.49
2.	Jawar	22	22	22	22	22	22	0.46
3.	Rice polished	5	5	4.5	4.5	4.5	4.5	0.24
4.	Guar meal	2	2	2	2	2	2	0.37
5.	Corn gluten meal 60 %	3	3	3	3	3	3	1.25
6.	Sesame meal	6	–	6	–	–	–	0.73
7.	Blood meal	4	4	2.5	2.5	4.0	4.0	1.22
8.	Fish meal	6	6	4.0	4.0	6.0	6.0	1.04
9.	Lime stone	5	5	5.0	5.0	5.0	5.0	0.12
10.	Bone meal	3	3	3	3.0	3.0	3.0	0.12
11.	Molasses	3	3	3	3.0	3.0	3.0	0.12
12.	Vitamin mineral premix & NaCl	0.5	0.5	0.5	0.5	0.5	0.5	5.00
13.	Detoxified mustard seed meal (DMSM)	–	6.0	4.0	10.0	–	6.0	0.37

(Continued)

14.	Decorticated cotton seed meal	–	–	–	–	5.0	–
15.	NaCl	0.465	0.465	0.465	0.465	0.465	0.465	0.65
16.	$MnSO_4$	0.025	0.025	0.025	0.025	0.025	0.025	
17.	$ZnSO_4$	0.010	0.010	0.010	0.010	0.010	0.010	
18.	Crude protein %	16.50	16.50	16.50	16.50	16.50	16.50	
19.	Animal protein %	4.60	4.60	3.00	3.00	4.60	4.60	
20.	Vegetable protein %	11.90	11.90	13.50	13.50	11.90	11.90	
21.	Metabolizable energy Kcal/kg	2916	2864	2900	2847	2924	2863	
22.	Crude fibre %	2.40	2.82	2.88	3.67	2.77	2.80	
23.	Calcium %	2.9540	2.9840	2.8526	2.7752	2.8322	2.8646	
24.	Phosphorus % (Total)	0.942	1.018	0.9187	0.9007	0.9240	0.9240	

Table 3. Feed efficiency of rations in egg production.

Description	Rations					
	A	B	C	D	E	F
Total No. of birds	12	12	12	12	11	10
Total No. of eggs produced during experimental period of 17 weeks	1029	981	996	674	765	797
Weekly egg production per group	60.53	57.71	58.59	39.65	44.47	46.88
Average egg production per 100 birds per day	72.06	68.70	69.74	47.20	57.76	66.97
Total feed consumed (kg) per group	204	213	200	162	167.5	179
Cost per Kg of feed (Rs)	1.21	1.15	1.16	1.12	1.20	1.15
Feed cost per dozen eggs (Rs)	2.88	3.00	2.80	3.23	3.19	3.10
Feed required per dozen eggs (kg)	2.379	2.606	2.410	2.884	2.656	2.695

The results also show that 33 % fish and 33 % blood meal or 100 % sesame/cotton seed meal can be replaced by DMSM. The above results were in agreement with earlier experiments by one of the authors (FHS) on broilers [6].

Cost per kg of feed, feed cost per dozen eggs produced and feed required per dozen of eggs (Table 3) in case of rations B, C and F were comparable with the control. It was however higher in case of ration D. The lower energy contents, higher crude fibre and palatability of DMSM, as compared to sesame meal is assumed to account for the higher amount of ration D required per dozen eggs, thus affecting the feed cost per dozen eggs.

CHEMICAL COMPOSITION OF EGGS

Protein: The crude protein contents of the eggs laid by hens fed on rations (A–F) were 13.18, 12.96, 12.66, 12.53, 12.78 and 13.36 % respectively. The data about crude protein contents of eggs revealed significant difference due to rations and non-significant difference due to weaks within a ration.

The variation in protein contents of eggs of hens fed on rations A, B and F were non-significant.

Although all the rations were isonitrogenous, the variation in the protein content of the eggs laid by hens of group C and D were lower than that of group A, B and F. This may be due to the lesser availability of the

essential amino acids from DMSM for incorporation into eggs as was observed by Rutkwoski and Alekliejezyk [9].

Egg Weight : Average egg weights of the hens fed on experimental rations A to F were 58.07, 59.34, 56.89, 53.52, 55.41 and 58.84 g respectively. This showed that replacement of 100 % sesame meal or 100 % cotten seed meal by DMSM also improved the egg weight.

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