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NUTRITIVE VALUE OF DRIED CORN STEEP LIQUOR AS A SUBSTITUTE FOR MEAT MEAL IN LAYING HENS' RATION

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Four experimental rations viz., A, B, C, and D were prepared containing 9, 6, 3, and 0 per cent meat meal and 0, 4, 8 and 12 per cent dried corn steep liquor respectively and were fed to laying hens on completely randomized design. Average weekly egg production on rations A, B, C, and D was 86, 85, 68, and 58 eggs and average feed efficiency was 4.7, 4.8, 6.1, and 7.1 respectively. This indicated that egg production and feed efficiency decreased with increased levels of dried corn steep liquor at the expense of meat meal. However, difference in egg production and feed efficiency between rations A and B was non-significant. Ration B was found to be the most economical followed in order by rations A, C, and D. The results thus revealed that 4 per cent level of dried corn steep liquor was the most optimum one to be used in laying ration and an increase beyond this level, at the expense of meat meal, adversly affected egg production, feed efficiency and economics of egg production.

INTRODUCTION

Poultry industry is handicapped on account of high feed costs which run over 50 per cent of the total cost of production. In order to bring down the present extremely high cost of feeding, it is imperative to shift emphasis towards the utilizaion of various types of by-products being introduced by the agricultural and industrial concerns. However, it must be kept in view that only those by-products should be preferred which are cheap and easily available in the local market.

Meat meal, a by-product of slaughter house, has been used in poultry rations for quite sometimes. Its market price has, however, now gone so high and availability has become so less that it has become a necessity of the time to search out some other product and try the same as a substitute for meat meal in poultry rations especially laying ration.

Corn steep liquor is a by-product of corn industry and contains 23

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per cent crude protein on "as such" basis and 40 per cent on "dry" basis. Due to the rapid development of corn industry in Pakistan, corn steep liquor can be abundantly available within country at quite reasonable rates.

An experiment was thus conducted to study the nutritive value of dried corn steep liquor as a substitute for meat meal in laying ration and its effects upon egg production, feed consumption, feed efficiency and economics of experimental rations.

MATERIALS AND METHODS

Seventy-two Brown Queen hens were taken and randomly divided into 12 experimental units of 6 birds each. Four experimental rations viz., A, B, C and D were prepared containing 9, 6, 3, and 0 per cent meat meal and 0, 4, 8, and 12 per cent dried corn steep liquor respectively. Three experimental units were randomly allotted to each experimental ration. Composition of experimental rations is given in Table 1. The experiment was conducted for 10 weeks on completely randomized design. The experimental rataions were fed *ad libitum*. Weekly records of egg production, feed consumption and feed efficiency were maintained. The data thus obtained were analysed statistically.

TABLE 1 *Composition of Experimental Rations*

Feed Ingredients	RATIONS			
	A	B	C	D
Meat meal	9.0	6.0	3.0	—
Dried corn steep liquor	—	4.0	8.0	12.0
Sorghum	20.0	19.0	18.0	17.0
Maize	45.0	45.0	45.0	45.0
Cotton seed cake (decorticated)	5.0	5.0	5.0	5.0
Wheat bran	8.0	8.0	8.0	8.0
Blood meal	4.0	4.0	4.0	4.0
Fish meal	3.0	3.0	3.0	3.0
Bone meal	2.0	2.0	2.0	2.0
Lime stone	3.5	3.5	3.5	3.5
Pre-mix	0.5	0.5	0.5	0.5
Crude protein (per cent)	19.9	19.7	19.6	19.4
Vegetable protein	9.7	11.1	12.7	14.1
Animal protein	10.2	8.6	6.9	5.3
Vegetable/Animal protein ratio	49:51	57:43	65:35	73:27

RESULTS AND DISCUSSION

Egg Production :

The data on egg production of hens fed different experimental rations is given in Table 2.

TABLE 2. *Egg Production on different Experimental Rations.*

Description	RATIONS			
	A	B	C	D
Number of hens	18	18	18	18
Total number of eggs produced during experimental period	861	847	678	577
Average daily egg production per 100 birds	68	67	54	47

Statistical analysis of the data (Table 3) revealed highly significant differences among the rations. However, difference between rations A and B was non-significant. This indicated that level of meat meal could be reduced from 9 to 6 per cent and that dried corn steep liquor could be added in its place up to 4 per cent level without any adverse effect on egg production. The results thus supported the findings of Matterson *et al* (1965) who reported that dried corn steep liquor concentrate could be used in laying rations. Egg production on rations C and D was found to be lower than on rations A and B. This indicated that addition of dried corn steep liquor beyond 4 per cent level at the expense of meat meal adversly affected egg production. The results did not agree with Cooper *et al* (1960) and Prasad and Mukherji (1967) who reported non-significant differences in egg production of hens fed rations with or without animal protein supplements. Better egg production on rations A and B, having vegetable/animal protein ratios of 49/51 and 57/43 respectively as compared with rations C and D, having vegetable/animal protein ratios of 65/35 and 73/27 respectively, might be on account of better supply of amino acids in rations A and B having higher levels of animal protein. The results were thus in line with the finding of Fitzsimmons *et al.* (1963) who reported that addition of essential amino acids to an all-vegetable ration resulted in improved egg production.

TABLE 3. *Analysis of Variance of data on egg production, feed consumption and feed efficiency.*

Source	D.F.	MEAN SQUARE OF		
		Egg production	Feed consumption	Feed Efficiency
Between rations	3	6277.89**	5.11 N.S.	36.8**
Within rations	8	143.42	2.55	0.14

N.S. = Non-significant

** = Significant at 1 per cent level.

Feed Consumption :

Total feed consumption of different groups of birds on rations A,B,C, and D was 335, 339, 343 and 343 pounds respectively. The difference among the rations were satistically non-significant. Feed consumption increased with increased levels of dried corn steep liquor which showed that it was quite palatable and acceptable for hens.

Feed Efficiency :

Average amount of feed required to produce one dozen of eggs was found to be 4.7, 4.8, 6.1, and 7.1 on rations A,B,C and D respectively. Difference between rations A and B was non-significant. Overall data on feed efficiency indicated that feed efficiency decreased with increased levels of dried corn steep liquor in the rations at the expense of meat meal. The results were in line with Russo and Victor (1958) who observed poor feed efficiency when 5 per cent corn fermentation condensed solubles were added in broiler ration to replace fish meal. The results did not agree with the findings of Prasad and Mukherji (1967) who made comparative studies of egg production with vegetable and animal protein supplements and found non-significant differences in egg production and feed efficiency on different rations with or without animal protein supplements. The results thus brought out that although feed consumption was more on rations having higher levels of dried corn steep liquor, yet no improvement on egg production could be obtained and hence feed efficiency became poorer with increased levels of dried corn steep liquor.

Economics of the Experimental Rations :

Economics picture of the experimental rations is shown in Table 4.

TABLE 4. *Economics of the experimental Rations.*

Description	RATIONS			
	A	B	C	D
Cost per 100 pounds of ration (Rupees)	29.70	28.74	27.78	26.82
Pounds of feed required to produce one dozen of eggs.	4.66	4.80	6.07	7.13
Cost per dozen of eggs (Rupees)	1.38	1.37	1.68	1.91

Cost per dozen of eggs produced on rotions A,B,C and D was 1.38, 1.37, 1.68 and 1.91 rupees respectively. This indicated that Ration B containing 4 per cent dried corn steep liquor was the most economical followed in order by rations A, C and D. High cost of egg production on ration C and D was due to poor feed efficiency on these rations containing 8 and 12 per cent dried corn steep liquor respectively. This indicated that higher levels of dried corn steep liquor in the laying rations, at the expense of meat meal, adversely affected economics of egg production.

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