Vol. XV (1-2), 1978

PROTEIN REQUIREMENTS OF LAYING HENS DURING SUMMER

A. G. Khan, M. A. Sial, Nazir Ahmad and A. R. Barque*

The requirements of laying hens for protein during hot summer season in Pakistan were investigated. A year old, ninety White Leghorn layers were selected and were randomly divided into 15 groups of six birds each. Five experimental rations viz., A, B, C, D and E containing 16.05, 18.00, 19.54, 21.21 and 22.86 per cent crude protein, respectively, were fed *ad-libitum*. The results indicated that the birds fed rations C and D with 19.54 and 21.21 per cent protein gave significantly better egg production as compared to that from rest of the three rations. The results of the present study suggested that the laying hens required 19.54 per cent protein during summer.

INTRODUCTION

Protein is an important constituent of poultry rations. A regular supply of adequate dietary protein for egg production and building up new body tissues is, therefore, essential. The egg production of birds has been found to be greatly affected by variation in the level of protein in the ration. Climatic stress especially high ambient temperature beyond 90°F certainly influences the feed intake. It was reported that birds consumed about 12 per cent less feed under high temperature (Prince *et al.*, 1965). The low intake of feed resulted in low intake of protein which ultimately affected egg production. Lange and Biogli (1968) provided 17.00 and 19.00 per cent crude protein in the diet of the layers during hot weather. They observed that birds fed ration having 19.00 per cent protein showed better egg production and feed efficiency.

Chen and Nockels (1974) reported that egg production was significantly increased in birds on ration containing 19 per cent protein as compared to those on 15 per cent protein ration. Sugandi *et al.* (1975) recommended the use of 19 per cent protein rather than 15 per cent with 2,650 or 2,850 Kcal of metabolizable energy per Kg in laying hens in tropics. Since the prevailing temperature as in summer months in this country are noticeably

*Department of Nutrition, University of Agriculture, Faisalabad.

high it was, therefore, planned to find out the level of protein that could appropriately meet the requirements of laying hens during summer season.

MATERIALS AND METHODS

A year old, ninety White Leghorn layers were randomly distributed into five groups with eighteen birds in each group. Each group was further subdivided into three replicates having six birds in each. These birds were caged in separated pens. Five rations viz., A, B, C, D and E were prepared having 16.05, 18.00, 19.54, 21.21 and 22.86 per cent protein, respectively and were allotted randomly to the various groups. Composition of the experimental rations is shown in Table 1.

The experiment was conducted according to completely randomised design for 10 weeks during summer. Feed was offered twice a day and watering was done three times to provide cool and clean water. Weekly record regarding egg production, feed consumed and feed efficiency was maintained.

Table 1. *Percentage composition of experimental rations*

Ingredients	RATIONS				
	A	B	C	D	E
Maize	29.00	41.00	49.00	49.00	49.00
Sorghum	30.00	15.00	15.00	15.00	15.00
Wheat bran	22.50	20.00	8.00	4.00	—
Til cake	0.50	4.00	7.00	10.00	13.00
Maize oil cake	0.50	1.00	1.00	1.00	1.00
Groundnut cake	0.50	1.00	1.00	1.00	1.00
Fish meal	4.50	4.00	4.00	4.00	4.00
Blood meal	3.50	4.50	5.50	6.50	7.50
Meat meal	3.00	3.00	3.00	3.00	3.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	3.50	3.50	3.50	3.50	3.50
Nutripole	0.50	0.50	0.50	0.50	0.50
Salt	0.50	0.50	0.50	0.50	0.50

RESULTS AND DISCUSSION

The data on egg production, feed consumption and feed efficiency of layers fed five different rations are shown in Table 2.

Table 2. *Egg production, feed consumption and feed efficiency of layers fed different rations.*

Description	RATIONS				
	A	B	C	D	E
Number of birds	18	18	18	18	18
Total egg production	658	695	794	756	703
Total feed consumed (lbs.)	312.7	333.4	338.1	340.1	313.1
Feed efficiency	5.81	5.86	5.14	5.55	5.39

Table 3. *Analysis of variance regarding egg production, feed consumption and feed efficiency.*

Source of variance	Egg production			Feed consumption		Feed efficiency	
	D.F.	M.S.	F.R.	M.S.	F.R.	M.S.	F.R.
Rations	4	96.02	10.3	6.21	2.56	2.69	2.56*
Weeks	9	47.60	5.1	10.84	4.48	2.35	2.23
R × W	36	35.03		4.32		1.61	
Error	100	9.28		2.42		1.01	
Total	149						

* Significant ($P<0.05$)

** Highly significant ($P<0.01$)

The total egg production on rations A, B, C, D and E was 658, 695, 794, 756 and 703, respectively. The data for egg production when subjected to statistical analysis revealed highly significant ($P<0.01$) difference in the production of birds fed different rations (Table 3). Ration C gave significantly better egg production as compared to rations A, B and E while a non-significant difference was observed when compared with that of ration D. These results showed that ration C gave maximum egg production. The present results

are in agreement with those of Lange & Biogli (1968), Chen & Nockels (1974) and Sugandi *et al.* (1975), who reported that during high temperature the egg production was better at 19.00 per cent protein level as compared to low levels of protein. The egg production of birds fed rations D and E was low, probably, due to stress caused by high protein levels (21.21 and 22.86).

The total feed consumption on rations A, B, C, D and E was 312.7, 333.4, 338.1, 340.6 and 313.1 pounds, respectively. Significant difference was observed among feed consumption of birds fed various rations. Rations A and E having 16.05 and 22.86 per cent crude protein were not significantly different from each other, whereas the other three rations were significantly different from rations A and E. The feed efficiency of birds fed different experimental rations was 5.81, 5.86, 5.14, 5.55 and 5.39, respectively. Better feed efficiency was observed in birds fed ration C with 19 per cent crude protien. The present findings appeared to be in agreement with those of Hochriech *et al.* (1957) and Lange & Biogli (1968). They observed that the feed efficiency was better at 19 per cent protein level

These results tended to indicate that the ration for layers during summer may preferably contain at least 19.54 per cent crude protein for better egg production and feed efficiency.

LITERATURE CITED

Chen, A. A. and C. F. Nockels. 1974. The effect of dietary vitamin C, protein, strain and age on egg quality, production, serum and albumen protein of chicken. (Nut. Abs. Rev , 44:1000) : Poul. Sci., 52 (5) : 1862–1867, 1974).

Hochriech, H. H., C. R. Boughlas, & R. H. Harm. 1957. The effect of dietary energy and protein levels upon the production of single comb White Leghorn hens. Poul. Sci., 36:1123-1127.

Lange, E., and C. Biogli. 1968. The level of protein in the diet of laying White Leghorn during hot weather. Poul. Sci., 48:148-152.

Prince, R. P., J. H. Whiter, L. D. Matternson and R. E. Luginbuhl. 1965 Response of chicken to temperature, relative humidity and environment. Poul. Sci., 44:73–77.

Sugandi, D. H., R. Bird and D. Atmadilag 1975. The effect of different energy and protein levels on the performance of laying hens in floor pens and cages in tropics. Poul. Sci., 54 : 1107-1114.