Utilization of some animal and plant protein feed ingredients in layers diet.

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ABSTRACT

An experiment was designed to evaluate the nutritive value of some local animal and plant protein supplements in layer's diet. 24 laying pullets 32 weeks of age were selected on the basis of producing 5 eggs/pullet/week and were kept in individual cages of a commercial laying battery for 8 weeks of age. They were given (i) control diet (C) containing imported layer concentrate, (ii) locally produced concentrate (LC), locally processed poultry offal meal (0), and plant protein concentrate (V) made of groundnut meal and sesame meal. All diets were approximately similar in crude protein, energy and essential amino acids (EAA).

Results showed that birds fed on control diet (C) had significantly **(P <** 0.01) higher feed intake, egg production and total egg mass than other groups. Feed cost and feed required to produce kg eggs were significantly (P < 0.01) less for group (C) than the other groups. No significant differences (P < 0.05) were obtained for the average egg weight among the four groups.

Performance efficiency indices (PEI) were not statistically significant (P < 0.05) among groups fed diets (C), (LC) and **(0).**

The results obtained from the present study indicated that the nutritional superiority of imported concentrate over locally produced animal and plant protein supplements can' be attributed to the poor quality of the local raw materials of these supplements.

INTRODUCTION

A major constraint of poultry production in the tropics is shortage **of suitable animal protein supplement. Most tropical countries depend on imported superconcentrate as** a source of animal protein supplement for profitable poultry enterprises. In Sudan the animal

protein source as meat meal, blood meal, offal meal and fish meal are often produced in limited amounts and mostily of poor quality. However plant proteins are available in larger quantities in the local market. In Sudan feeding poultry depends on local feed ingredients together with imported concentrate. No doubt the imported concentrate improves quality of feed and performance of ' birds. For this reason the heavy dependence on imported concentrate still continues among poultry producers. The cost of imported concentrate is high and its availability is sometimes uncertain. The present study is conducted to evaluate the nutritive value of some local by-products prepared under local processing conditions. A second objective is to find alternative sources of protein supplements of cheaper cost to replace the expensive imported animal protein supplement.

MATERIALS AND METHODS

36 laying pullets 32 weeks of age were received on 20/1/1998 selected out of 500 laying pullets on the basis of good general condition and uniform starting body weight and then housed in a commercial laying battery. The 36 laying pullets were divided into four groups. Each group contained 9 laying pullets and each pullet was kept in an individual cage. The laying pullets were also subjected to another biological test when fed on common basal diet to select high producing hens on the basis of producing 5 eggs/pullet/ week. 24 laying pullets were selected and divided into four groups (C), (LC), (0) and (V). Each group was composed of 6 laying pullets fed on the same experimental diet. Four isonitrogenous and caloric diets with the same pattern of essential amino acids (EAA) were formulated in this experiment. The composition and calculated analysis of the four diets are given in the Table (1). The composition of locally produced concentrate is given in Table (2). Proxithate and amino acids analysis were carried out in the Netherlands. The experimental design was based on Completely Randomized Design (CRD). The data of the experiments were analyzed by the analysis of variance and mean separation test was made by the Least Significant Difference (LSD) (Thomus *et al.,* 1978).

Table 1. Experimental diets and their calculated nutrient contents.

Ingredients %	C %	LC %	0 %	V %
Grain sorghum	60.2	60.3	60.0	60.0
Groundnut meal	9	9 .	9	8
Sesame meal	–		–	
Wheat bran	15.39	15.39	15.00	15.00
Vegetable oil	0.31	–		0.05
Layer concentrate	5[1m]	5	–	
Offal meal			4	
Oyster shell	8.00	8.00	8.00	. 7.15
Bone meal	1.77	2.31	2.85	3.11
Salt	0.25		0.15	0.25
L-lysine Hcl	0.08		0.46	‘Q.34
DL-methionine			0.14	0.06
Vitamins + minerals	–		0.40	0.40
Total	100	100	100	100

N.B.: Im = Imported concentrate, Lc = Local concentrate.

MEKca1/kg %	2820	2811	2837	‘2811
CP%	17.5	17.5	17.7	17.6
Lysine%	0.75	0.83	0.77	0.75
Methionine%	0.35	0.35	0.36	0.36
Meth. + cystine%	0.61	0.50	0.50	0.65
Calcium%	3.80	3.68	3.75	3.63
Av. Phosphorus%	0.50	0.42	0.43	0.41
Crude fiber%	3.20	3.16	4.10	3.33
Fat%	3.10	3.50	3.00	3.38

Table 2. Composition of locally produced concentrate

Ingredients	
Fish meal (40% CP)	30
Meat meal (54% CP)	14.71
Blood meal (35% CP)	5
Groundnut meal	15
Sesame meal	15
Bone meal	9.3
Dried alfa alfa	0.8
L-lysine monopdydrochloride	7.5
DL-methionine	2.19
Preservative (sodium benzoate)	0.1
Vitamins + minerals	0.4
Total	

RESULTS

The performance data for the experimental groups are shown in Table (3). The group fed on control diet (C) containing imported concentrate consumed significantly ($P < 0.01$) more feed than groups fed on locally produced concentrate (LC), offal meal (0)and vegetable protein concentrate (V). The data of energy, protein and essential amino acids (EAA) intakes are shown in Table (4), group (C) exhibited significantly ($P < 0.01$) higher intake of these essential nutrients. The group fed on diet (C) laid significantly ($P < 0.01$) more eggs than other groups. Differences in average egg weight and weight of dozen eggs are not significant ($P < 0.05$) among the four groups but when judged by total egg mass a significant difference ($P < 0.01$) was seen among tested groups when compared with the control group (Table 3). The quantity of feed required to produce a dozen or a kg of eggs was significantly ($P < 0.01$) less for group (C) and higher for group (V). Loss in final body weights among treatment groups was obvious for groups (LC), (0) and (V). There was a relationship between percentage of egg production and body weights (Table 3).

The highest egg production was observed for group (C), which also recorded a higher body weight. It is observed from the data in (Table 3) that the group fed on plant protein diet (V) had significantly ($P < 0.01$) low performance efficiency indices (PEI) when compared with other groups fed on animal by-products (C), (LC) and (0).

The highest cost for kg feed, as shown in (Table 2), was recorded for group (C). On the other hand the average values for feed cost/dozen or kg eggs were significantly ($P < 0.01$) low for group (C) than the other groups (Table 3).

Table 3 . Animal and Plant Protein in Layer's Diet.

Parameter	(C)	(LC)	(0)	(V)
Feed consumption/bird/day (g)	137.8[a]	118[b]	114.3[bc]	104′
Total feed consumption in				
56 days (kg)	7748[a]	6475[b]	6416[b]	6250[b]
Egg production/bird/56 days (eggs)	288	199	178	137
Egg production percentage				
(%)	85.4	59.5	51.8	37
Egg weight (g)	56	53	53	51
Weight of dozen Eggs (g)	672	636	636	612
Total egg mass (g)	2748.3[a]	1795[b]	1609[b]	1113′
Feed/dozen eggs	1.94[a]	2.36[ab]	2.6[b]	3.33′
Feed/kg eggs	2.85[a]	3.62[ab]	3.99[b]	5.24′
Starting live body weight				
.(g/b)	1431	1417	1460	1414
Final live body weight change (g/b)	1400	1094	1158	1028
Performance efficiency index (PEI)	42[a]	38″	33[bc]	28′
Cost of kg feed (SP) .	476	397	390	464
Feed cost/dozen eggs (SP)	924[a]	937[a]	1014[a]	1545[b]
Feed cost/kg eggs(SP)	1357[a]	1437[a]	1556[a]	2432[b]

C: Control LS: Level of significance LC: Local concentrate

LSD: Least significant difference 0: Poultry offal meal

SP: Sudanese pound V: Vegetable protein concentrate. NS: Non significant. Values within the same raw with different superscripts are

significantly different at (P< 0.01) level of significance.

Table 4. Protein, lysine, methionine and energy intake.

DISCUSSION

The possible explanation for higher feed intake, egg production and total egg mass for group (C) *Vs* other groups could be due to the better quality of protein source (Calden and Jensen, 1990), high intake of protein and amino acids (AA) (Prachask *et al.,* 1996 Lin and Hsu, 1995), protein quality variation (Oruseibio, 1995), differences in true available amino acids (AA) (Barbour and Sim, 1992). It is important to note here that diets containing the same level of protein and AA from different sources give different available amounts of the nutrients according to their -sources. This shows that the dietary level of different nutrients is not only the nutritional factor to be considered in feeding poultry. One important factor for consideration

is to what extent does the nutrient content of each ingredient or
combination of different ingredients is truely available to the birds.

The lowest PEI for group (V) may be accounted for by the withdrawal of animal protein. These results are in general agreement with reports obtained by Godhindi *et al.,* (1973) who indicated that the PEI of birds fed vegetable protein were low and were improved by vitamin B12 addition. No doubt the high cost of kg feed for control group is attributed to the imported concentrate in foreign currency. On the other hand the higher feed cost/kg eggs for groups (V), (0) and (LC) may be to the low nutritive value of feed. These groups need extra feed to compensate for the necessary essential nutrients to produce kg eggs. In conclusion the poorer performance of groups fed on local by-products is due to the inferior quality of the raw materials utilized in compounded feed.

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