EFFECT OF DIETARY LEVELS OF UNPROCESSED AND UNDEHULLED SUNFLOWER SEEDMEAL ON THE PERFORMANCE OF LAYING HENS.

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ABSTRACT

An experiment was conducted to investigate the effects of feeding graded levels of unprocessed and undehulled sunflower seedmeal on the performance of laying hens. One hundred and fifty Black Harco layers in their second month of egg production were randomly alloted to five diets in which sunflower seedmeal (SSM) was tested at levels of 0, 2.5, 5.0, 7.5 and 10.0% of the diets for a ten week period. Average daily feed intake (ADFI), egg weights, egg shell thickness, yolk index and Haugh units did not show any significant ($P > 0.05$) treatment effects. SSM significantly ($P < 0.05$) increased per cent egg production at 7.5 and 10.0% levels over control. Body weight was significantly ($P < 0.05$) depressed by 5.0 and 10.0% SSM. Dressed carcass weight (% liveweight) of birds on 7.5% SSM was significantly ($P < 0.05$) higher than those of birds on the rest of the diets. Hens on 7.5 and 10% SSM had intestines which were significantly ($P < 0.05$) longer than the intestines of hens on the other diets. Caecum length of birds on 10% SSM was significantly ($P < 0.05$) higher than those of birds on diets 1 to 4; these hens however showed no significant treatment effect on their caeca length. Liver, gizzard and net carcass weights were not significantly ($P > 0.05$) affected by SSM. The effect of SSM on egg production would seem to recommend 7.5% as the optimum level of SSM inclusion.

Keywords: Sunflower seedmeal, unprocessed, undehulled, egg production, layers.

INTRODUCTION

Previous investigations on feeding processed and dehulled sunflower seedmeal to starter chicks and layers showed that it was essential to supplement the diets with synthetic lysine and methionine since processing temperatures denature these amino acids (Mc Ginnis *et al.*, 1948; Marrison *et al.*, 1953; Klain *et al.*, 1956; Rad and Keshavarz, 1976). Sunflower seeds are abundantly available in the sub-sahelian region although it is not economically feasible to dehull the seeds manually (dehulling machines were not available at the time of this study), compared to the rest of the ingredients used in formulating layers' mash, sunflower seedmeal is much cheaper (₦1.00 per kg). With a high crude protein content of 26.30% and rich content of several B-vitamins (Day and Levin, 1954, Klain *et al.*, 1956), sunflower seedmeal in poultry feeds will have come at a very opportune time in the Nigerian poultry industry when poultry farmers are finding it extremely difficult keeping their farms open due to escalating prices and scarcity of feed ingredients. This study was therefore designed to determine the effects of various dietary levels of unprocessed and undehulled sunflower seedmeal on the performance of laying hens.

MATERIALS AND METHODS

A total of one hundred and fifty Black Harco laying hens in their second month of egg production were randomly distributed to five diets treated with unprocessed and undehulled sunflower seed meal (SSM) *(Helianthus annus)*. Each treatment was replicated three times with 10 birds per replicate to give 30 birds per treatment. The hens were paired in 75 cages. Sunflower seedmeal was tested at the levels of 0 (Control), 2.5, 5.0, 7.5 and 10% of the diets. (Table 1). Birds were adjusted to the experimental diets for a period of 7 days during which time no data were collected. At

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the end of the adjustment period, the hens were then individually weighed before data collection commenced. Feed and clean drinking water were provided *ad libitum*. Average daily feed intake, liveweight change, total egg production, egg weight, egg shell thickness, yolk index, Haugh units and selected carcass characteristics were taken as indices of performance.

Data collected were subjected to analysis of variance. Means were separated and compared using Fisher's least significant difference test (Snedecor and Cochran, 1967).

TABLE 1: COMPOSITION OF THE SSM-BASED EXPERIMENTAL DIETS (g/100gDm)

INGREDIENTS	DIETS I	II	III	IV	V
Maize	51.00	51.00	51.00	51.00	51.00
Groundnut Cake	10.00	10.00	10.00	10.00	10.00
Fish Meal	3.50	3.50	3.50	3.50	3.50
Blood Meal	1.00	1.00	1.00	1.00	1.00
Periwinkle Shell	6.50	6.50	6.50	6.50	6.50
Wheat Bran	25.00	22.50	20.00	17.50	15.00
Sunflower Seedmeal	0.00	2.50	5.00	7.50	10.00
Vitamin-mineral Premix	0.25	0.25	0.25	0.25	0.25
Bone Meal	2.25	2.25	2.25	2.25	2.25
Salt	0.50	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00	100.00
Calculated and Analysed Composition of diets					
a. Metabolizable energy (Kcal per g)	2.84	2.81	2.80	2.79	2.77
b. Crude Protein (%)	17.10	17.14	17.52	17.54	17.56
a. Crude Fibre (%)	5.37	5.38	3.38	5.42	5.43
b. Calcium (%)	3.46	3.47	3.36	3.37	3.36
b. Phosphorus (%)	0.82	0.83	0.80	0.77	0.76
a Lysine (%)	0.62	0.64	0.65	0.64	0.62
a. Methionine (%)	0.61	0.61	0.63	0.64	0.63

a Calculated; b Analysed

RESULTS AND DISCUSSION

Data on layer performance and selected egg quality characteristics are presented in table 2. Average daily feed intake (ADFI) increased across treatments as the study progressed, but did not show any significant ($P>0.05$) treatment differences at any given point of the investigation; overall ADFI was however numerically highest for hens on 7.5% SSM, (124.75g) followed by control (120.25g). These results are in agreement with the findings of Michael and Sunde (1985) who fed unspecified levels of SSM and reported that feed consumption was not generally increased by sunflower seedmeal. Walter *et al* (1959) had earlier shown that 9.5 and 13.0% SSM increased ADFI, while Deaton *et al.*, (1979) observed increased ADFI with increase in dietary SSM level. These latter workers attributed this increase probably to the increased dietary fibre levels.

Total egg production was computed and presented as mean per cent egg production. The rate of egg output was initially low since the pullets were in their second month of production at the beginning of the study, however with time all the birds increased their egg production. Hens on 7.5 and 10.0% SSM had significantly ($P<0.05$) higher percent egg production (65.64) and 61.92% respectively) than those on the rest of the treatments while 7.5% SSM induced the highest mean percent output; there was no significant ($P>0.05$) difference, however, between 7.5 and 10.0% SSM, nor between the control and the rest of the treatments. In this trial SSM did not depress egg output, rather, at 7.5 and 10.0% levels, it significantly ($P<0.05$) increased production. Deaton *et al.*, (1979) had reported that egg production was not affected by the addition of SSM in layers diets, an observation which is at variance with the results of this study.

Mean egg weights showed slight increases after the first week and then stabilized throughout the study period. There were no significant ($P>0.05$) differenceS between egg weights in all the treatments; this is in

TABLE 2: EFFECTS OF DIETARY LEVELS OF SUNFLOWER SEEDMEAL (SSM) ON PERFORMANCE OF LAYERS AND EGG QUALITY

PARAMETERS	0% SSM	2.5% SSM	5.0% SSM	7.5% SSM	10% SSM	SEM[2]
ADFI (g/day/bird)	120.25	119.00	114.75	124.75	116.24	±6.710
%egg production	56.07[a]	56.07[a]	56.42[a]	65.64[b]	61.92[b]	±4.280
Mean egg weight (%)	60.13	58.94	60.44	60.37	59.09	±0.650
Mean egg shell thickness (mm)	0.35	0.36	0.35	0.37	0.36	±0.007
Average yolk index (abs. units)	0.32	0.32	0.34	0.32	0.33	±0.008
Average Haugh Units (abs. units)	86.38	82.88	85.00	84.57	84.93	±1.120
Body weight change (% weight loss)	0.55[a]	1.09[a]	4.89[b]	0.53[a]	6.03[b]	±0.025
Feed Conversion Ratio: (feed/egg)	3.82	3.79	3.63	3.39	3.35	-
Feed Cost (₦/egg)	2.62	2.38	2.37	2.24	2.15	-

[1] Standard error of mean.
a,b, Means in the same row with different superscripts are different ($P < 0.05$).

agreement with the report of Deaton *et al.*, (1979) that sunflower seedmeal did not affect egg weights.

Although there were no significant ($P > 0.05$) differences between treatments with respect to egg shell thickness, birds on 7.5% SSM recorded the highest value of 0.37mm. While the values obtained in this investigation are higher than those reported by Oluyemi and Roberts (1982) they quite agree with the values obtained by Deaton and Coworkers (1979) who concluded that eggshell thickness was not affected by sunflower seedmeal treatment. With respect to yolk index and Haugh units, there were no significant ($P > 0.05$) treatment effects recorded.

Data for liveweight change are presented as percent weight loss since all the hens lost weight throughout the entire study period. Birds on 5.0 and 10.0% SSM suffered significantly ($P < 0.05$) higher percentage weight loss than those on 0, 2.5 and 7.5% SSM. This weight loss was higher in birds on 10.0% SSM while the lowest was obtained from hens on 7.5% SSM. Clearly, this effect does not seem to be treatment-related. However, since this study was conducted during the hot period of the year, high ambient temperatures, peaking at 34°C, were recorded, and this, rather than any specific deleterious effects of sunflower seedmeal would be more likely to depress body weight (Oluyemi and Roberts, 1982), since control hens were also affected.

During the entire period of the investigation, a total mortality of 4.67% was recorded. Birds on control and 2.5% SSM accounted for 1.33% each while birds on 5.0, 7.5 and 10.0% SSM had 0.67% mortality each. Again, since even the control birds produced one of the higher mortalities, these deaths cannot therefore be due to any specific treatment effects, and since histopathological examinations revealed nothing abnormal, heat stress caused by high ambient temperatures was most likely to blame (McDowell, 1972; Oluyemi and Roberts, 1982).

Table 3 shows the effects of various dietary levels of sunflower seedmeal on selected carcass characteristics of laying hens. Birds on diet IV (7.5%SSM) had significantly ($P < 0.05$) higher dressed carcass weight (68.09%) than birds from the rest of the treatments which however showed no significant ($P > 0.05$) differences between treatments. Liver and gizzard weights as percent of liveweight did not differ significantly ($P > 0.05$) due to treatment effects. There were significant ($P < 0.05$) differences between treatments in lengths of intestines. Birds on 2.5 and 5.0% SSM had Significantly ($P < 0.05$) longer intestines than control hens while hens on 7.5 and 10.0% SSM had significantly ($P < 0.05$) the

TABLE 3 EFFECTS OF DIETARY LEVELS OF SUNFLOWER SEEDMEAL (SSM) ON SOME CARCASS CHARACTERISTICS OF LAYING HENS.

PARAMETERS	0% SSM	2.5% SSM	5.0% SSM	7.5% SSM	10% SSM	SEM[1]
Hot carcass weight (% liveweight)	83.10	88.21	88.98	89.09	90.94	±1.68
Dressed carcass weight (% liveweight)	62.10[a]	59.48[a]	59.17a	68.09[b]	59.25[a]	±3.41
Liver weight (%liveweight)	0.022	0.020	0.019	0.017	0.019	±0.01
Gizzard weight (% liveweight)	0.030	0.027	0.033	0.031	0.031	±0.02
Intestine length(cm)	155.30[a]	186.42[b]	184.05[b]	192.50[c]	193.20[c]	±14.30
Caecum Length (cm)	18.20[a]	15.35[a]	19.50[a]	18.10[a]	23.00[b]	±2.60

[1]Standard error of mean.
a,b,c, Means in the same row with different superscripts are different ($P<0.05$).

longest intestines. Since these hens had reached maturity before the study commenced coupled with the fact that sunflower seeds are not generally known to contain any toxic principle or an irritant which might affect length or size of the gastro-intestinal tract, it seems more likely that these differences in lengths may be due to the corresponding variations in body, since feed crude fibre level was more or less constant for all the diets. Caeca of birds on 10.0% SSM were significantly ($P<0.05$) longer than those of hens on the other treatments, while there were no significant ($P>0.05$) differences between the caeca of birds on treatments I to IV. This may again be due to the fact that the birds on the 10.0% SSM had higher body weights, rather than a hypertrophic reaction to the high fibre content of the sunflower seedmeal since poultry do not digest or ferment fibre to any appreciable extent; % crude fibre in this study did not vary appreciably and was within normal range.

In conclusion, this study showed that sunflower seedmeal, at the levels investigated, exerts no detrimental effects on the performance of laying hens. Rather than depress egg production, sunflower seedmeal at 7.5 and 10.0% inclusion rates increased egg output over control. Since the cost of sunflower seedmeal at the time of this study was much cheaper than that of wheat bran, SSM not only increased egg production (at 7.5 and 10.0% levels) but also resulted in the formulation of a more economical ration for layers.

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