INFLUENCE OF DIETARY WILD SUNFLOWER *(Tithonia diversifolia* Hemsl. A Gray) LEAF MEAL ON LAYERS PERFORMANCE AND EGG QUALITY.

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ABSTRACT

The performance of layers on various dietary levels of Wild Sunflower leaf meal (SLM) was investigated. Seventy-two Nera Black commercial layers in their fourth month of lay were randomised into six dietary treatments comprising a commercial layer mash (CLM) and 05, 10, 15 and 20% SLM. Results revealed that egg production was appreciably supported even for layers on 15 and 20% SLM diets. Feed consumption ranged from 96.27 gms in layers fed 20% SLM to 106.86 gm for birds on CLM. Feed conversion efficiency in terms of kg feed per dozen eggs was highest for 15% SLM while CLM had the highest cost of feed consumed per dozen eggs. All diets supported a net positive body weight gain on the birds. Haugh unit, yolk index, shell thickness and egg weight were not significantly influenced ($P > 0.05$) by dietary treatments. Yolk colour was significantly ($P < 0.05$) enhanced by SLM (at all levels) over either the control or CLM. There was no mortality throughtout the 12 weeks that the experiment lasted.

Key words: Sunflower, leafmeal, layer, performance, yolk colour.

INTRODUCTION

In the developing countries, there is a shortage of food energy and protein sources due to rising demand and increasing population. A major solution to this problem is seeking new and non-conventional sources of protein such as leafy plants which can be incorporated into poultry diets. The protein from leaves may be recovered and fed as solution in form of leaf protein concentrates (Farinu *et al.,* 1992). However, the technology for this is not yet developed in tropical Africa. The foliage portions of plants including banana (Cambel, 1989 a,b), sesbania versus alfalfa leaf meals (Shquier *et al.* 1989) and cassava (Rajaguru *et al.* 1979; Sanchez *et al,* 1989) have been cut, dried and fed to poultry with varying degrees of success. The wild sunflower *(Tithonia diversifolia)* is a weed of cultivated crops, wasteland and roadsides. Akobundu and Agyakwa (1987) grouped it in the family Asteraceas while Greensil (1964) classified it as a member of the family Compositae with the nomenclature *(Tithonia rotundifolia).* The plant is found in dense stretches on both sides of the highway in South-western Nigeria up to the Middle Belt area as well as to the extreme Eastern parts of Nigeria.

There is scanty report on the feeding value of the plant for poultry in Nigeria. Observations showed that sheep and goats graze the plant especially at the flowering stage and farmers feed the cut herbage to rabbits. These preliminary findings suggest that the plant has potentials as a forage crop for both ruminant and monogastric feeding hence this study was aimed at evaluating the nutritional effects of wild sunflower forage meal as an ingredient in layer diets. Its ability to influence egg yolk pigmentation was also assessed.

MATERIALS AND METHODS

Freshly cut samples of *Tithonia diversifolia* (leaf + inflorescence) at the flowering stage were collected from plants on the Ladoke Akintola University of Technology farm plots. They were sundried for about 48 hours, ground into fine meal and stored in jute bags until needed.

Seventy two Nera Black commercial layers in their fourth month of lay were weighed individually and randomly distributed among

six dietary treatments. Each treatment consisted of 12 layers which were further subdivided into 2 replicates of 6 birds each. The wild sunflower leaf meal(SLM) was incorporated into a control layer diet (16.7% crude protein and 2.65 kcal/kg ME) at 5, 10, 15 and 20% in the diet. A commercial layer mash (CLM) was procured and used for comparison. TABLE 1

Feed and water were provided *ad libitum* while body weights were taken at 2 weekly intervals. Parameters monitored were egg production, egg weight, feed itnake, feed conversion efficiency and egg quality values. Albumen height was measured using a tripod spherometer to calculate Haugh unit while egg yolk colour was determined by the Roche colour fan score method and shell thickness with a micrometer screw gauge. The prevailing market prices of feed ingredients at the termination of study were used for the assessment of economics of feed conversion. The trial lasted 12 weeks. Proximate analysis of test ingredients and diets were carried out according to the methods of A.O.A.C. (1990). Data collected were subjected to analysis of variance, means were separated and compared using the F-test level of significance (Gomez and Gomez, 1985) at 5% level of probability.

TABLE 1: COMPOSITION OF DIETS CONTAINING GRADED LEVELS OF WILD SUNFLOWER LEAF MEAL AND A COMMERCIAL LAYER MASH.

Ingredients[1]	0	5	10	15	20	CLM[a]
White maize	46.50	46.00	45.50	45.00	44.50	-
Wheat bran	20.90	16.40	11.90	7.40	2.90	-
Sunflower lead meal	0.00	5.00	10.00	15.00	20.00	-
Fixed ingredients[b]	32.60	32.60	32.60	32.60	32.60	-
Total	100.00	100.00	100.00	100.00	100.00	-
Calculated Analysis						
Crude protein	16.75	16.75	16.75	16.75	16.75	17.00
Crude fibre	4.37	4.51	4.65	4.79	4.93	5.04
Ether extract	6.69	6.68	6.68	6.68	6.68	7.14
Ash	3.21	3.61	4.01	4.42	4.83	4.14
ME (kcal/kg)	2.65	-	-	-	-	2.50
N/kg[2]	9.27	9.07	8.86	8.66	8.45	10.00

[a] Commercial layer mash - composition not supplied, analysis as indicated
b. Fixed ingredients supplied to each diet (%): Toasted Soyabean meal, 20.00; fish meal (65%); 2.00; Oyster shell 7.50; Bone meal, 2.50; Methionine, 0.10; Salt, 0.25; Premix* 0.25

*Premix supplied per kg diet; Vit. A 7,000,000 iu; vit. E. 13, 00 iu; Vit K, 1500, mg; vit B12 10mg; Riboflavin, 5000mg; Pyridoxine, 1,300 mg; Thiamine, 1300mg; Nicotinic acid, 28 mg; Folic acid, 0.5mg; Biotin, 0.4 mg; cu, 7 mg; Mn, 48 mg; Zn, 58 mg; methionine, 50mg; BHT, 50mg; Fe, 58 mg; Se, 1.20 mg; I, 0.6 mg; Co, 3 mg Ch, 257 mg.

[1] Ingredient prices as at December 1994

[2] Nl = 0.0125 US $

RESULTS

Proximate composition of wild sunflower leaf meal revealed that it contains 16.61% crude protein, 12.00% crude fibre, 5% ether extract, 14% ash and 52.39% nitrogen free extracts.

Table 2 shows the influence of wild sunflower leaf meal on production performance of birds. There was a decrease ($P<0.05$) in Hen day production at 15 and 20% SLM levels while the other diets had similar ($P>0.05$) values. Feed consumption was highest for layers on control and CLM, while significant reductions were observed at all levels of SLM with the lowest value of 20% SLM. Feed required per dozen eggs was high for birds on 15% SLM, 20 control diet while birds on 5, 10 and CLM had no significant differences. Feed cost per dozen eggs was cheaper at low levels of SLM while the CLM had the highest value. There was no significant difference in body weight gain and egg weight among dietary treatments. There was no mortality throughout the duration of the experiment.

Data on egg quality values are shown in Table 3. Dietary treatments exhibited no significant ($P>0.05$) changes on Haugh unit, yolk index and egg shell thickness. Yolk colour

values for birds fed diets containing SLM were significantly higher than either control or CLM, significant increases were also noticed as level of dietary SLM increased.

wheat bran in the diets. However, all diets supported a positive output in terms of body and egg weight values which shows that metabolic activities were maintained. Only in

TABLE 2: PERFORMANCE OF LAYERS FED DIFFERENT LEVELS OF SUNFLOWER LEAF MEAL (SLM) AND A COMMERCIAL DIET.

Parameters	Level of SLM diets (%) 0	5	10	15	20	CLM	
Hen day production	64.86[a]	68.05[a]	67.06[a]	54.27[b]	57.25[b]	65.87a	204
Daily feed intake (5 bird)	105.82[a]	103.09[b]	102.62[b]	102.56[b]	96.27c	106.86[a]	289
Egg Weight (gm)	60.93	59.75	62.06	62.30	61.26	60.91	051
Body weight gain (gm/bird)	100.00	81.50	155.50	246.00	123.50	63.00	204
Feed per dozen eggs (kg)	1.96[b]	1.82[a]	1.84[a]	2.27c	2.02[b]	1.86[a]	000
Feed cost per dozen eggs	18.16[c]	16.41[a]	16.23[a]	19.64[d]	19.04[b]	19.70[d]	055

Means within rows followed by different superscripts are significantly different ($P < 0.05$).

TABLE 3: EGG QUALITY VALUES FOR LAYERS FED SLM BASED-DIET AND A COMMERCIAL LAYER MASH FOR 12 WEEKS.

Parameters	Level of SLM in diets (%) 0	5	10	15	20	CLM	SEM
Haugh unit (%)	77.46	77.97	79.95	79.60	80.58	78.31	3.39
Yolk index	0.43	0.44	0.45	0.46	0.46	0.44	0.001
Shell thickness (mm)	0.36	0.36	0.36	0.36	0.37	0.37	0.0002
Yolk colour	1.55[a]	5.80[c]	7.02[d]	8.27[e]	9.10f	2.13[b]	0.146

Means within row followed by different letters are significantly different ($P < 0.05$).

DISCUSSION

The use of leaf meals is not yet a widespread practice despite its abundant presence in Southern part of Nigeria for most part of the season.

Proximate values for SLM are similar to that recorded by Kuti (1991). There were 15% crude protein, 9.94% crude fibre, 8.47% ash, 2.19% ether extract and 55.31% nitrogen free extracts. The value got are also close to literature values recorded for banana leaf meal, cassava leaf meal and *Tridax procumbens* (Aduku, 1993). Wild sunflower leaf meal also compares appreciably with bran, dried brewers grains, maize offal and palm kernel cake (in terms of protein and fibre contents), all of which are used in poultry feeding. Reduction in feed intake by SLM-fed birds could not be easily explained as birds were actually expected to increase consumption due to the expected reduction in metabolizable energy value caused by reduced levels of maize and

terms of egg number was there any deleterious effect of SLM at levels more than 10%. The inclusion of leaf meals in diets will most likely lead to an increase in indigestible organic matter which definitely increase the amount of bulk. This may decrease the availability of metabolizable energy to the birds, which became pronounced at high levels and coupled with reduction in feed intake, egg production was reduced.

Cambel (1989 a,b) reported poor feed consumption at 25% level of azolla meal and lowest average gain among broilers fed with 15% banana leaf meal. He attributed the findings to the possible high fibrous nature of the diets. Sanchez *et al.* (1989) also fed cassava foliage to chicks and reported that growth was favoured up to 10% level while higher concentrations (15 and 20%) did not increase weight gains. Limiting factors implicated were low methionine content, low energetic characteristics due to high fibre content and possible high concentrations of cyanuric acid

present in the leaf. The use of *Leucaena leucocephala* leaf meal has been found to be limited by the presence of mimosine, tannins and low metabolizable energy (Taplin *et al.* 1981). Only sesquiterpene lactones which are feeding deterrents for *Philosamia ricini* have so far been identified in the leaves of wild sunflower (Dutta *et al.*, 1986).

Economically, the use of wild sunflower leaf meal appears favoured up to 10% judging from the data on kg feed per dozen eggs and cost of feed consumed per dozen eggs produced. Items of cost will only include collection, drying and grinding of foliage portions of the plant that grows in the wild. Comparatively, birds on commercial diet performed equally as well as control, 5 or 10% SLM - diets in all ramifications excepts that CLM has a higher feed cost/dozen eggs. No noticeable adverse symptoms including mortality were recorded and up to 20% SLM level had no deleterious effect on egg quality. This could indicate absence of any toxic constituent. A positive development is the enhancement of egg yolk colouration. Levels as low as 5% gave a significant increase in yolk colour which favours the Nigerian market that prefers a deep orange coloured yolk. Adjusting egg yolk to suit local tastes had been done by various groups and many feeding stuffs have been used to achieve this purpose including Leucaena seed meal (Okonkwo and Adikpe, 1988); *Adansonia digitata* Luru, *Cynodon plectostachyum;* Giant star grass (Ogunmodede and Wogar, 1976). The influence of Sunflower leaf meal on yolk colour is due to the presence of carotene and xantophyllous pigments which is a feature of greenstuffs. The higher the level of sunflower leaf meal in the feed, the more golden the yolk colour.

This feeding trial showed that small holder poultry farmers especially in Southern Nigeria would find wild sunflower leaf meal a valuable supplement in layer diets as well as a cheap source of enhancing yolk colouration. Further trials that would elucidate the nutritional value of sunflower leaf meal are recommended.

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