Sunflower seed meal as a protein concentrate in diets for broiler chicks

F. I. M. SALIH and SAFIA H. TAHA.

Poultry Research Unit, Kuku, P. 0. Box 89, Industrial Area, Khartoum North, Sudan.

SUMMARY

A broiler conventional diet was supplemented with O, 100, 200 and 400 gl kg sunflower seed meal (SSM) to provide 4 approximately isocaloric and iso- nitrogenous treatments.

The effects of increasing SSM as a protein concentrate was conducted on broiler chicks from 7 to 42 day of age in which growth performance was in- vestigated.

The study indicated that the rate of feed intake, liveweight gain, dressing percentage, mortality and feed conversion efficiency (FCE) were insignifi- cantly affected by the level of SSM in the diet.

INTRODUCTION

The expanding poultry industry in the Sudan has increased the demand for plant and animal proteins considerably. Recently, the production of sunflower has been introduced and expanded as an oil seed crop. The seeds after har- vesting were used in the production of edible vegetable oil_ After processing SSM remained in surplus amounts at a competitive price as a source of pro- tein for livestock feeding compared with animal by-products.

Several studies have investigated the nutritional value of SSM in poultry rations (Pettit et. al., 1944; Gran and Almquist, 1945; Mc Ginnis et. al., 1948; Morrisson et. al., 1953; Thomas et. al., 1965). Wessels (1967) illus- trated that SSM can be used as a protein source in chick starter rations and that lysine is the most limiting amino acid in SSM.

Walter et. al. (1959) observed increased feed consumption of laying hens when the diet contained 9.5 to 13.0% SSM. Waldroup et. al. (1970) reported that broiler diets containing up to 30% SSM were satisfactory if pelleted. However, for mash diets it was necessary to limit SSM to not more than 15% of the diet.

Shenstone and Packham (1974) found that inclusion of 22.5% sunflower seeds in the laying diets reduced egg production and increased egg size. However, Uwayjan et. al. (1983) reported that inclusion of 30% sunflower seed had no adverse effect on laying perfomiance, and the supplementation of these diets with eigher lysine or methionine did not improve laying perfor- mance. Rose et. al. (1972) have demonstrated that supplementation of diets containing oil extracted SSM with lysine reduced feed consumption of laying hens. Recently Karunajeewa et. al. (1987) showed that increasing levels of sunflower seeds in diets significantly increased egg weight while rate of egg production, mortality, FCE were not affected. However, published reports on the nutritive value of SSM for the feeding of the domestic fowl under Sudan conditions are lacking. This study was intended to gain more informantions on the possibility of using SSM as a pro- tein concentrate in diets of broiler birds.

MATERIALS AND METHODS

Two hundred and forty one day old Hypro broiler chicks locally hatched were assigned at random to 4 groups of 60 chicks each. Each group was fur- ther subdivided into 3 replicate group with 20 birds per each. The 12 repli- cates were housed in conventional brooders (4.5 X 2.8 X 2.5 M) on wood shaving. All chicks were wing tagged and were trained for one week to the experimental procedure and fed the control diet

Four mash dietary treatments of 4 levels (0, 100, 200 and 400 g/ kg) of SSM were randomly assigned to the 4 groups (table 1). The SSM was ob- tained from Arab Sudanese Company for vegetable oil production, Khartoum North, as a by-product remaining after oil extraction.

The composition of the experimental diets were determined according to Ellis (1981). Amino acid analysis were calculated

according to Ceres-U-K- Ltd (1971). Proximate analysis of SSM was done by the staff of Central Animal Nutrition Laboratory, Kuku.

The experimental diets were offered from the second week to the end of the experiment. The birds had free access to feed and water at all time. A day length of 24 hours was provided during the experimental period of 35 days. The birds were weighed individually and feed consumption recorded at weekly intervals.

At the end of experiment 10 birds were randomly selected from each treatment, individually weighed after an overnight fast (Water available) and slaughtered without stunning. After the birds were allowed to bleed, they were scalded in hot water and feathers were plucked manually. Then the birds were evicerated, cleaned and the dressing percent was computed. The collect- ed data were subjected to Student t - test according to Snedecor and Cochran (1980).

Table 1: Composition of the experimental diets (D) g/ kg.

	D1 0 SSM	D2 100SSM	D3 200SSM	D4 400SSM
Ingredients				
Sorghum	598	598	548	450
SSM	-	100	200	400
Sesame cake	200	100	50	50
Groundnut cake	144	144	144	40
Super concentrate* (5%)	50	50	50	50
Oyster shell	8	8	8	10
Total	1000	1000	1000	1000
Calculated analysis				
M.E. (MJ/ Kg)	13.6	14.3	13.6	14.1
C.P.%	25.8	24.8	25.4	24.2
C.F.%	4.7	4.3	4.1	3.5
Lysine	10.1	10.2	11.0	11.0
Methionine + Cystene	9.8	9.0	9.0	10.0
Methionine	5.2	4.7	4.7	5.5

** Super concentrate (hendrix) supplied 2200 Kcal ME, 40% C.P., 8.75% lysine, 1.6% methionine, 2.0% M + C., 7.6% Ca and 4.8% P.*

RESULTS AND DISCUSSION

The composition and analysis of the diets are given in table 1. Chemical composition of SSM compared with sesame and groundnut meals are present- ed in table 2. Performance data is presented in table 3.

Table 2: Chemical composition of SSM in comparison to sesame and groundnut meals g/ kg.

Nutrient	SSM	Sesame	Groundnut
C.P.	267.5	397.7	430.1
E.E.	61.8	122.2	71.6
Ash	58.0	144.5	89.0
C.F.	44.1	91.7	92.5
M.E. (MJ/ kg)	13.71	11.72	11.57
Lysine%	11.0	10.7	15.5
Methionine%	7.2	12.0	5.2
M + C	12.7	21.0	11.3

Feed intake, rate of liveweight gain, dressing percent and FCE were not significantly affected by the levels of inclusion rates of SSM. However, birds fed on diets supplemented with SSM consumed substantially more feed than the control group.

The mortality remained low (1.7 - 3.3%) throughout the study period and has no relationship to the SSM concentration in the dietary treatments. ’

Since the performance of the broiler chicks recieving the lower level (10%) of SSM was not reduced significantly there was no doubt that the quality of the protein in SSM was satisfactory for broiler production. This finding con- firm that of Hale and Brown (1957). However Mc Ginnis et. al. (1948) showed that addition of 0.6% of DL-Lysine hydrochloride improve growth on diets containing sunflower meal.

Table 3: Performance of broiler chicks.

Parameter	D1 0 SSM	D2 100 SSM	D3 200 SSM	D4 400 SSM	Significance level
No. of chicks	60	60	60	60	NS
Initial weight (g)	83 ± 4	80 ± 4	83 ± 4	86 ± 3	NS
Final weight (g)	1201 ± 42	1189 ± 34	1141 ± 38	1152 ± 37	NS
Liveweight gain (g)	1118 ± 33	1109 ± 30	1058 ± 27	1066 ± 31	NS
Food intake (g)	2146 ± 41	2271 ± 32	2295 ± 42	2265 ± 37	NS
FCR (kg feed/ Wt. gain)	1.92 ± .06	2.05 ± .06	2.17 ± .03	2.13 ± .12	NS
Mortality%	3.3	3.3	1.7	3.3	
Dressing%	73.12 ± 4.95	72.76 ± 6.64	69.27 ± 3.79	73.16 ± 4.14	

N.B.
NS = not significant ($p > 0.05$)

It is interesting to observe that the SSM used in the present study main- tained relatively low fibre concentration (44.1) compared with (100.4 g/ kg) reported by Green et. al. (1987). This disrepancy might reflect differences in the methods of processing as well as genetical make up of the different varie- ties of sunflower seeds.

It has been shown that sunflower seeds have a high oil content (Ranken, 1984) and an increased unsaturated fatty acids, particularly linoleic acid (Karunajeewa et. al., 1987) than other oilseeds. Moreover Green et. al. (1987) confirmed that true digestibility of most essential amino acids in sun- flower and groundnut meals were similar to or greater than those of soybean meal. Exceptionally, lysine was more digestible in soybean than in sunflower or groundnut meals.

To conclude, the results of this experiment confirmed that SSM has the potential to supplement adequately broiler perfonnance without ill-effects.

ACKNOWLEDGEMENTS

We thank Dr. Shadiya A. Omer for the help in providing SSM, the staff of Central Animal Nutrition Laboratory - Kuku and the staff of Poultry Section for the care and management of the animals.

REFERENCES

Ceres (U. K.) Ltd. (1971). Feeding Stuffs: Average Analysis and nutritive value tables. Published by N. V. Granaria, Amersfoort, the Nether- lands. Ellis,

N. (1981). The nutritive composition of Sudanese Animal Feeds. Bull. No. 1, Northern and Central Sudan. Central Anim. Nutr. Res. Lab., Khartoum U., Sudan.

Grau, C. R. and Al mquist, H. J. (1945). Value of sunflower proteins. Proc. Soc. Expt. Biol. Med. 60, 373 - 374.

Green, S., Bertrand, S. L., Mande Leine, Duran, J. C. and Maillard (1987). Digestibility of amino acids in soybean, sunflower and groundnut meals, determined with intake and caecectomised oockerels. Brit. Poult. Sci., 28, 643 - 652.

Hale, R. W. and Brown, W. O. (1957). Sunflower meal as a protein concentrate for laying hens. J. Agric. Sci., 48, 366 - 372.

Karunajeewa, H. Samir Abu Serewa, Sing,H.Tam, and Paul Easton (1987). The effect of dietary level of sunflower seeds and lysine on egg quality and laying performance of white Leghom hens. J. Sci. Food Agric., 41, 325 - 333.

Mc Ginnis, J., Hus, P. T. and Carver, J. S. (1948). National differences of sunflower seed oil meal for chicks. Poult. Sci., 27, 389 - 393.

Morrisson, A. B., Clandinin, D. R. and Roblee, A. R. (1953). The supplementary value of sunflower seed oil meal in practical chick start- ing rations. Poult. Sci., 32, 542 - 547.

Pettit, J. H., Slinger, S. J., Evans, E. V. and Marcellus, F. N. (1944). The utilization of sunflower seed oil meal, wheat distillers dried grains and rapeseed oil meal in poultry rations. Can. J. Agric. (Sci. Agric.), 24, 201 - 213.

Ranken, J. D. (1984). The oil seeds industry. Grist, 32, 8 - 9.

Rose, R. J., Coit, R. N. and Sell, J. L. (1972). Sunflower seed meal as a replacement for soybean meal prtoein in laying hen rations. Poult. Sci., 51, 960 - 967.

Shenstone, F. S. and Packham, R. G. (1974). The effect of diets derived of animal protein and ranging in lipid content on egg production, quality and lipid composition. Proc. Austral. Poult. Sci. Conv, Hobart, Tas- mania, 131, 134.

Snedecor, G. W. and Cochran, W. G. (1980). Statistical Methods, 7th E.d., The Iowa State Univ. Press., Ames, 1A.

Thomas, O.P., Martin, R.S., Wessels, J.P. H. and Human, J. B. B. (1965). Sunflower meal as a source of protein for chicken rations. South African J. Agric. Sci., 8, 1061 - 1068.

Uwayjan, M. G., Azar, E. J. and Daghir, N. J. (1983). Sunflower seed in laying hen rations. Poult. Sci., 62, 1247 - 1253.

Waldroup, P.W., Hillard, C. M. and Mitchell, R. J. (1970). Sunflower meal as protein supplement for broiler diets. Feedstuffs, 42 (43), 41.

Walter, E. D., Lindblad, G. S. and Aitken, J. R. (1959). The value of sun- flower seed oil meal as a protein supplement for laying hens. Can. J. Anim. Sci., 39, 45 - 49.

Wessels, J . P. H. (1967). The amino acid su lementation of sunflower meal for the feeding of chickens. South Xgrican J. Agric. Sci., 10, 441 - 448.