Growth response of rabbits fed graded levels of processed and dehulled sunflower seeds

W.O. Biobaku and E.O. Dosumu

Department of Animal Production and Health, University of Agriculture, P.M.B. 2240, Abeokuta, Nigeria

Abstract

The effects of processed and dehulled sunflower seed (PUSS) as feed supplement, on the performance of growing rabbits was studied. The eight weeks feeding trial involving twenty four, six weeks old male and female New Zealand white rabbits weighing 600-650g in a completely randomized design were feed three diets containing 0% (control), 10% and 20% processed and dehulled sunflower seeds. The processed and dehulled sunflower seed was high in both fat and fibre levels (25.42 and 29.82%) respectively but low in both protein and nitrogen free extract (17.92 and 16.48%) respectively. The 10% level of inclusion of PUSS in the diet gave significantly ($P < 0.05$) better weight gains than the 20% PUSS. Feed efficiency and protein efficiency were similar for the control and 10% PUSS supplements, which were both superior ($P < 0.05$) to the 20% PUSS diet. There was no incidence of enteritis or mortality among the treatment groups.

Key words: Rabbits, processed dehulled sunflower seed.

Introduction

Nigeria and the world as a whole are faced with many nutritional problems, the most acute being malnutrition and especially protein malnutrition. The best source is animal protein, which is expensive and often not within reach of the average family. The few rich urban dwellers cannot even boast of quality animal protein sources. As a result of low protein intake, we suffer from numerous diseases, mental retardation, high infant mortality and stunted growth.

In view of solving the problem of shortage and inadequate animal protein sources, caused by the adverse effect of economy on other sources of animal protein, great attention has been shifted to rabbit production. Rabbit has the following advantages, they do not require as much space as cattle, sheep, goats and pigs.

The cost of rabbit housing is low compared to any of the other livestock. They have high fecundity and prolificacy. Rabbit has a short gestation period of 28-32 days.

Biobaku and Oguntona (1997) reported that rabbit meat is wholesome, tasty, low in cholesterol, sodium and fat but high in protein. Anthony *et al.* (1990) reported that in commercial production, the rabbit is close to modern broiler chicken in terms of growth rate, feed conversion efficiency and meat quality.

Nutritionists now embark on non-conventional, cheaper agro-industrial feed resources as a substitute, to reduce the high cost of conventional feed resources for livestock animals, in view of this, sunflower seed was thought of. Sunflower seed (*Helianthus annuus*) as reported by Dutta (1981), is a good source of cooking oil, crude protein, vitamins and

minerals. It also has adequate amount of nitrogen free extract, and fibre.

Weiss (1983) reported that average composition of oil from temperate sunflower seed is 55-60% linoleic acid and 25-30% oleic acid, but seed produced under high temperature may contain 65% oleic acid and 20% linoleic acid. Bamgbose (1995) reported that sunflower seedmeal contained 92.69% dry matter, 37.55% crude protein and 17.66% crude fibre which were adequate for rabbit production. Okonkwo and Oketola (1995) reported that inclusion of sunflower seed at 7.5 and 10% in the diet of laying hens increased percentage egg production. A 7.5% of sunflower seed feed inclusion increased dressed carcass weight (Okonkwo and Oketola 1995). However Micheal and Sundie (1985) reported that feed intake was not generally increased with increase in level of sunflower seed in the diets of pullets. The objective of this study is to evaluate the effect of feeding processed and dehulled sunflower seeds at different levels on the performance of growing rabbits.

Materials and Methods

About 5kg of raw sunflower seeds were collected from the Teaching and Research farm of the University of Agriculture, Abeokuta. The seeds were cooked with water in a large water bath at a temperature of between 70-80°C for ten hours. The heated and dehulled seeds were oven dried at a temperature of 80°C for 20 hours. The dried seeds were milled in the hammer mill and sieved through a nylon cloth. Twenty-four Six week old New Zealand White rabbits weighing 600-650g were obtained from the Rabbitary Unit of the Teaching and Research farm of the University of Agriculture, Abeokuta. The animals were divided into three groups of

eight each, with an average weight of 625g for each group. Each group was further sub-divided into two such that duplicate groups of four rabbits were obtained for each sub-group with two rabbits per cage.

Three diets consisting of complete rabbit basal diets, 10% processed and dehulled sunflower diet, and 20% processed and dehulled sunflower diet, were formulated as shown in Table 1. The diets were all pelleted and were calculated to contain 19.74 - 22.64% Crude protein. The rabbits were fed the pelleted diets daily at 0.08h and given water *ad libitum* for a period of eight weeks.

Records of weekly body weight gain, feed intake, faeces voided, feed efficiency, protein efficiency and protein digestibility were calculated.

Digestibilities of the diets were carried out at the sixth week of experiment and lasted for seven days. The first four days were for adaptation of the animals to the new environment and the last three days were used for collection. Two rabbits were used per replicate. Records of the daily feed intake and daily faeces were kept. Faeces collected were dried in an oven at about 125°C for 24-28 hours.

Analytical techniques

Samples of seed and the three rations were analysed for proximate composition according to A.O.A.C (1990) methods.

Statistical Analysis

Performance records of the animals were subjected to one way analysis of variance by method of Snedecor and Cochran (1967). Duncan's multiple range test method (1955) was then used to determine significances between means.

Rabbit performance on processed and dehulled sunflower seed

Table 1: *Percentage Composition of Experimental Diets*

Components (%)	Dietary levels of processed unde-hulled sunflower seed (PUSS)		
	0%	10%	20%
Maize	45.54	40.60	36.78
Soybean meal	17.98	12.92	6.74
PUSS	0.00	10.00	20.00
Blood meal	2.58	2.58	2.58
Brewer's dried grain	30.00	30.00	30.00
Oyster shell	2.00	2.00	2.00
Bone meal	1.00	1.00	1.00
Methionine	0.40	0.40	0.40
Vit/Mineral Premix	0.25	0.25	0.25
Salt	0.25	0.25	0.25
	100.00	100.00	100.00
Calculated Analyses			
Protein (%)	21.98	21.25	19.91
Energy ME (KJ/g)	11.21	10.67	10.20
Fibre (%)	17.88	20.33	22.75
Methionine (%)	0.32	0.45	0.57
Lysine (%)	1.09	1.10	1.08

Results and Discussions

The processed, unde-hulled sunflower seed used in this experiment contained 17.92% crude protein and 29.82% crude fibre, suggesting that it can be suitable for rabbit feeding (Table 2).

The levels of crude fibre were, for the control diet (27.48%), 10% PUSS diet (28.96%) and 20% PUSS diet (29.24%). Cheeke (1983) had reported that although rabbits digest fibre poorly, dietary

fibre is useful in preventing enteritis and fur chewing. Arveux (1980) reported that fibre is indispensable for the adequate filling of digestion tract and maintenance of normal peristaltic movement. Although the crude fibre in these diets varied from 27.48 - 29.24%; there was no observation of caecal impaction, and this agrees with the works of Ekpenyong and Biobaku (1986), that crude fibre in the diet of rabbits can be varied from 28 - 32% with no caecal impaction.

Table 2: Chemical Composition of sunflower seeds and the Experimental diets (g/100g Dry matter)

Chemical Composition (%)	Processed, unde-hulled Sunflower Seed (PUSS)	Dietary level of Sunflower Seed		
		0%	10%	20%
Moisture	4.48	3.64	3.72	3.68
Crude Protein	17.92	19.74	21.64	22.64
Crude Fibre	29.82	27.48	28.96	29.24
Nitrogen Free Extract	16.48	23.16	18.90	17.48
Ether Extract	25.42	16.24	17.74	18.24
Ash	3.60	6.84	6.34	6.16
Minerals				
Calcium (%)	0.20	0.48	0.42	0.42
Phosphorus (%)	0.64	0.82	0.76	0.70
Potassium (%)	0.66	0.74	0.70	0.64
Magnesium (%)	0.78	0.86	0.82	0.80
Sodium (%)	0.046	0.040	0.044	0.048
Zinc (ppm)	260	272	282	264
Manganese (ppm)	248	268	272	266
Iron (ppm)	134	136	138	142

The effect of the experimental diets on growth and feed efficiency is shown in Table 3. Rabbits fed 10% PUSS diet showed the highest ($P<0.05$) weight gain, followed by control diet, with the least ($P>0.05$) value recorded for 20% PUSS diet. Higher level of growth with high protein level was in agreement with the findings of Omole (1982).

The significantly ($P<0.05$) higher growth rate observed in the rabbits fed 10% processed and dehulled sunflower seed diet was expected and is in agreement with the findings of Biobaku (1998). However feed efficiency ratios were not significantly ($P>0.05$) affected between the rabbits fed 0% and 10% PUSS diets but significantly higher ($P<0.05$) between rabbits fed the 10% PUSS diet and rabbits fed 20%

PUSS diet and this agrees with findings of Biobaku *et al* (1999). The protein efficiency ratio of rabbits fed with 10%PUSS diet was significantly ($P<0.05$) higher than those of rabbits fed with the 20% PUSS diet.

The rabbits fed with 10% PUSS diet had the highest apparent protein digestibility and this is significantly ($P<0.05$) different when compared with those rabbits fed with the 0% and 20% PUSS diets respectively and this agrees with findings of Biobaku (1993) who reported that during the process of digestion, toxic substance present in the raw diet may associate with the protein of the diet, thereby causing their increased faecal excretion and this may be responsible for the decreased apparent protein digestibility.

Rabbit performance on processed and undehulled sunflower seed

Table 3: Effect of diets on growth performance of Rabbits

	Dietary level of Sunflower seed*			SEM**
	0%	10%	20%	
Number of Rabbits	8	8	8	
Initial Body weight (g)	625 ^a	625 ^a	625 ^a	4.84
Final Body Weight (g)	1593.24	1719.80	1340.12	32.48
Daily Weight gain (g/day)	17.29 ^b	19.55 ^a	12.77 ^c	0.72
Daily Feed Intake (g/day)	71.79 ^b	76.07 ^a	72.50 ^b	3.14
Feed efficiency ratio	0.240 ^a	0.257 ^a	0.176 ^b	0.04
Protein Efficiency ratio	0.262 ^a	0.274 ^a	0.179 ^c	0.18
Apparent Protein Digestibility %	76.24 ^b	90.48 ^a	68.24 ^c	3.04

* Means along the same row with different superscripts are significantly different ($P < 0.05$)

** Standard error of mean, values are the means of eight analyses.

Table 4 shows that the cost of feed consumed decreased gradually as the percentage of processed and undehulled sunflower seed in the diet increased. However, the inclusion of 10% PUSS in the ration of rabbits is the most economical in terms of cost of feed per kilograms of weight gain when compared with

rabbits fed 0% and 20% PUSS diets respectively and this agrees with the findings of Biobaku (1998) who reported that a diet may be the cheapest, the utilization by the animals may be the poorest.

Table 4: The influence of Experimental diets on the Economy of Rabbit Production

	Dietary level of Sunflower seed**			SEM**
	0%	10%	20%	
Total Feed Consumed (Kg)	2.51 ^b	2.66 ^a	2.54 ^b	0.36
Total Weight gained (Kg)	0.605 ^b	0.684 ^a	0.447 ^c	0.012
Total Cost of Feed Consumed (N)	55.47 ^a	50.01 ^b	38.31 ^c	1.42
Cost/Kg feed (N)	22.10 ^a	18.80 ^b	15.08 ^c	2.64
Cost of feed/Kg weight gain (N/Kg)	91.69 ^a	73.11 ^c	85.70 ^b	6.42

* Means along the same row with different superscripts are significantly different ($P < 0.05$)

** Standard error of mean values are the means of eight analyses.

References

Anthony, Y; Ezedima, F.O.C and Ochapa, O.
1990. Introduction to tropical Agriculture
ELBS with longman, pg 232-234.

Association Official Analytical Chemists
(AOAC) 1990. Official Methods of
Analysis 15th Ed Association of Analytical
Chemists, Washington, D.C

Arveux, P. 1980. Fibre Requirement of Rabbit
(French) *Cuniculture* 7:13-14.

Bamgbose, A.M. 1995. Chemical analysis of
some oilseed cakes; *Indian Journal of
Anim Sci.* 65 (12) 134-1346.

Biobaku, W.O. 1993. Effect of feeding raw
and cooked *Delonix regia* seed bean on the
performance of Rabbits. *J. of Agric. Tech.*
(1) 56-60).

- Biobaku, W.O. and Oguntona, E.B.** 1997. The effects of feeding multi-nutrient Miniblocks and pelleted diet on the growth of Rabbits *Nigerian J. of Animal Production* 24(2): 147 -149.
- Biobaku, W.O.** 1998. Growth response of rabbits fed graded levels of groundnut shell, Effect on organ weights and enzyme activities *J. Pure and Appl. Sci* (1): 44-50.
- Biobaku, W.O., Adeniji, A.K. and Johnson, O.** 1999. Comparative effect of sun-dried rabbit faeces and sundried partially fermented rabbit faeces on the performance of growing rabbits. Effect on organ weights and enzyme activities. *Tropical J. Anim. Sci.* 1(2): 95-101.
- Checke, P.R.** 1983: The significance of fibre in Rabbit Nutrition. *J. Appl. Rabbit Res.* 6: 103-106.
- Duncan** 1955. Multiple range and multiple F. Test. *Biometrics.* 11, 1- 42.
- Dutta, A.C.** 1981. Botany for degree students 4th edition. Published by Pergamon Press, Oxford. pg. 740 - 741.
- Ekpenyong T.E. and Biobaku, W.O.** 1986. Growth response of rabbits fed activated Sewage sludge and dried poultry waste. *J. of Appl. Rabbit Res.* 9(1) 14 - 16.
- Michéal, J.N. and Sunde, M.C.** 1985. Sunflower meal in pullet developer diets. *Poultry sci.* 64 (669 - 674).
- Okonkwo, A.C. and Oketola, F.A.** 1995. Effects of dietary levels of unprocessed and dehulled sunflower seed meal on the performance of laying hens. *Nig. J. of Anim. Prod.* 21 (1): 91 - 96.
- Omole, T.A.** 1982. Effect of dietary protein on growth and productive performance in rabbits. *J. Appl. Rabbit Res* 5 (3): 83 - 85.
- Snedecor, G.R. and Cochran, W.L.** 1967. *Statistical Method.* The Iowa State University Press.
- Weiss, E.A.** 1983. Oilseed Crop longman Group Ltd. United States of America pp. 414 - 416.

(Received 13 June 2001; Accepted 22 July, 2002)