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Effect of Feeding Different Plant Protein Sources on the Growth and Economic indices of weaner Rabbits in the Semi – Arid Zone of Nigeria

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Abstract

An eight-week feeding trial was conducted to investigate the effect of different plant protein sources on the growth performance and economic analysis of cross-bred (Dutch x New Zealand white) weaner rabbits aged between five to seven weeks. Forty eight rabbits were randomly allocated to four dietary treatments with twelve (12) rabbits per treatment,. Groundnut cake; sunflower meal; Bambara nut meal and soya bean meal for treatments 1, 2, 3, and 4 respectively. Results showed that the growth parameters were not significantly (P>0.05) different among the treatment groups except mean daily feed which was significantly (P<0.05) different. Based on Growth and economic performance Rabbits fed T1 (groundnut cake) perform better than other treatment groups, it was concluded that groundnut cake is a better plant source of protein for rabbits. Therefore, recommending that farmers can be used groundnut cake as a source plant protein in diet of weaner rabbits.

Keywords: Groundnut cake, Sunflower meal, Bambara nut meal, Soybean meal, Growth Performance and Economic Analysis

Description of Problem

The need to improve rabbit production in Nigeria for increased supply of animal protein is no longer in doubt due to the high cost of chicken, pork and beef. (1) Reported the necessity of exploring other less common but potential sources of animal protein such as rabbits it is important. Recently, there has been increased awareness in rabbit production in Nigeria. The advantages Of rabbit projected include the high reproductive rate, rapid maturity, high genetic potential, efficient feed utilization, less competition with humans for food and high quality nutritious meat (2).

Rabbits have been introduced into West Africa as farm animals of economic value, low in fat, succulent, nicely flavoured and providing a palatable change for chicken and other meat (1). It has also been reported (1) that rabbit meat plays an important role in the prevention of vascular disease due to its extremely low cholesterol and sodium levels compared to other livestock. This makes rabbit meat a good source of animal protein for coronary heart patients and people on low sodium diet.

Feed accounts for the leading input in animal production ranging from 60 to 70% of the total cost of production (3*)*. It has been reported that conventional feedstuffs are very expensive and scarce, the high cost and scarcity derived from crippling realities that are characteristics of the economics of developing countries. Plant protein sources are generally cheaper per unit of nutrient as compared with the animal protein sources. In

general, plant protein supplements are lower in some essential amino acids and minerals such as phosphorus as compared with animal protein supplements. However, the cost of animal protein sources is generally higher than that of plant protein sources, but the inclusion rates for animal protein sources are lower. Plant proteins are usually deficient in one or more amino acids; hence, the needs to supplement with animal protein like fish meal (4). This study was aimed at determining the effect of different plant protein sources on the growth and economic performance of growing rabbits

Materials and Methods

Experimental Animals and Management

The study was conducted at the Livestock Teaching and Research Farm, University of Maiduguri, Maiduguri, Borno State, Nigeria. Forty eight crossbred rabbits (Dutch x New Zealand white) between 5 and 7 weeks of age were used for the 8 – week feeding trial. The rabbits were individually weighed, equalized for weight and randomly assigned to the four (4) dietary treatments in groups of twelve (12). Each rabbit was caged individually in a completely randomized manner. The rabbits were provided with the experimental diets and clean drinking water *ad libitum*. Data collection commenced after an initial adjustment period of seven days.

Experimental Diets

The experimental diets are shown in Table 1. Four experimental diets were formulated using four (4) different plant protein sources: T1 contained groundnut cake, T2 (sunflower cake), T3 (bambaranut meal) and T4 (soya bean meal).

Table 1: Composition of the Experimental Diet (%)

Ingredients	T1	T2	T3	T4
Maize	40.00	40.00	40.00	40.00
Groundnut cake	23.00	0.00	0.00	0.00
Sunflower meal	0.00	23.00	0.00	0.00
Bambaranut meal	0.00	0.00	23.00	0.00
Soya bean meal	0.00	0.00	0.00	23.00
Fish meal	3.00	3.00	3.00	3.00
Groundnut haulm	15.95	15.95	15.95	15.95
Wheat offal	15.00	15.00	15.00	15.00
Bone meal	2.50	2.50	2.50	2.50
Salt (NaCl)	0.30	0.30	0.30	0.30
Premix	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**

* Premix (grow fast) Manufactured by Animal Care Service Consult (Nig) Ltd. Lagos, Supplying the following per kg of premix: Vitamin A, 5000,00 IU; Vitamin D_3 800,000IU; Vitamin E, 12,000mg; Vitamin K, 1,5000mg; Vitamin B_1, 1,000mg; Vitamin B_2, 2,000mg, Vitamin B_6, 1,500mg; Niacin, 12,000mg; Pantothenic acid, 20.00mg; Biotin,10.00mg; Vitamin B_{12}, 300.00mg; Folic acid, 150,000mg; Choline, 60,000mg; Manganese, 10,000mg; Iron;15,000 mg, Zinc 800.00mg; Copper 400.00mg; Iodine 80.00mg; Cobalt 40mg; Selenium 8,00 mg ,
T1= Groundnut cake; T2 =Sunflower meal; T3 =Bambaranut meal and T4 =Soya bean meal

Data collection

The daily feed intake was obtained by subtracting the left over feed from total amount of feed supplied. Each rabbit was weighed at the inception of the experiment and weekly thereafter to obtain the weekly and daily body weight gain throughout the experimental period. The feed conversion ratio was calculated as the dry matter feed intake per unit weight gain. The proximate composition of the diets was determined according to (5).

Economic analysis

The economic implication of including four different plant protein sources in the diets of growing rabbits was assessed by calculating the:

(i) Total feed intake per rabbit;
(ii) Total weight gain;
(iii) Cost per kilogramme of each diet; and
(iv) Cost per kilogramme of weight gain by the rabbit.

Statistical Analysis

Data collected were subjected to analysis of variance and where significant differences were observed, means were compared by Duncan's multiple range test (6) as outlined by (7).

Results and Discussion

Proximate Composition of the Experimental Diets

The values recorded were within the normal ranged of 12 to 22.5% (CF) as reported by (9) for growing rabbits. (10) also reported dietary fibre content should be in the range of 15 to 20% (CF) as the ideal level for growing rabbits. The ether extract of the diets ranged from 3.00 to 4.00% among the treatments. The values obtained in this study agreed with the finding of (11) who reported 3 to 5% fat in the diet of growing rabbit can supply the essential fatty acids and reduce dustiness of the feed. The ash content were different in all the treatments which ranged between 8.00 in T4 (soya bean meal) and 11.50% in T2 (sunflower meal) diet. The diet containing soya bean meal (T4) had the highest value of nitrogen-free extract while other diets recorded lower and similar values. The metabolizable energy (ME) in the T1 (groundnut cake) and T4 (soya bean meal) diets recorded the higher and similar values while the lowest value was observed in T2 (sunflower meal) diet. However, all the diets were adequate to provide required energy for normal growth and production as reported by (12).

Table 2: Proximate Composition of the Experimental Diets

Nutrients (%)	T1	T2	T3	T4
Dry matter	94.55	96.96	96.85	95.20
Crude protein	19.51	15.91	18.64	17.09
Crude fibre	16.50	19.00	18.50	17.00
Ether extract	3.50	3.00	4.00	3.50
Ash	8.50	11.50	9.00	8.00
Nitrogen-free extract	51.99	50.59	49.86	54.41
ME	2850.65	2627.62	2783.71	2847.39

ME = Metabolizable energy calculated according to the formula of (13); as ME = 37x%CP+81x%EE+35.5x% NFE

T1= Groundnut cake; T2 =Sunflower meal; T3 =Bambaranut meal and T4= Soya bean meal

Growth Performance of Rabbits Fed Different Plant Protein Sources

The growth performance of rabbit fed different plant protein sources is presented in Table 3. There were not significant (P>0.05) difference among all the parameters measured except the feed intake which was significantly (P>0.05) difference. The final weight obtained in this study ranged from 988.80 in T3 (bambaranut meal) to 1105.30g in T1 (groundnut cake). The values obtained in this study were close to the values (1120 to 1415g) recorded by (14) who fed graded levels of poultry litter in the diets of growing rabbits. The daily weight gain obtained in this study ranged between 12.6 in T3 (bambaranut meal) and 14.98g T1 (groundnut cake). These values were within 10 to 20g/rabbit/day reported by (11) for rabbits reared in tropical environment. The daily feed intake was significantly higher (P<0.05) in T2 (sunflower meal) than those fed T3 (bambaranut meal) and T4 (soya bean meal) but similar to T1 (groundnut cake) group. The values obtained in this study were similar to the values of 44.82 to 65.4g reported by (14) who fed graded levels of poultry litter in the diets of growing rabbits. The values of feed conversion ratio obtained in this study ranged between 3.28 and 4.00 which were better than values (3.7 to 8.51) reported by (14) who fed rabbits with different commercial grower diets. This is an indication that rabbits fed different plant protein sources utilized the available nutrient in the diets.

Table 3: Growth Performance of Growing Rabbits Fed Different Plant Protein Sources

Parameters	T1	T2	T3	T4	SEM
Initial weight (g)	280.17	271.67	2 95.50	270.22	50.60^{NS}
Final weight (g)	1105.30	1044.30	988.80	1098.50	65.13^{NS}
Daily weight gain (g)	14.98	13.88	12.64	14.80	0.87^{NS}
Daily feed intake (g)	50.81^{ab}	54.56^{a}	46.11^{c}	49.65^{bc}	1.49^{*}
Feed conversion ratio	3.28	4.00	3.79	3.42	0.26^{NS}

SEM = Standard error of means, NS = Not significant (P> 0.05);
*= significant (P< 0.05); a, b, c = Means in the same row bearing different superscripts differ significantly (P<0.05); T1= Groundnut cake; T2 =Sunflower meal; T3 =Bambaranut meal and T4 =Soya bean meal

Economic indices of Growing Rabbits Fed different Plant Protein Sources

The result of the economic indices of growing rabbit fed different plant protein sources is presented in Table 4. The highest feed cost per kg ¦ 100.78 was recorded in T2 (sunflower meal) followed by T4 (soya bean meal) which had ¦ 99.63 while the lowest feed cost per kg ¦ 93.88 was obtained in T1 (groundnut cake). This may be due to different cost of plant protein sources at the time of experiment. The paramount cost per kg gain was recorded in T1 (groundnut cake) while the poorest cost per kg gain was obtained in T2 (Sunflower meal). Therefore, based on economic analysis rabbits fed T1 (groundnut cake) is more benefit to rabbits farmers in Nigeria.

Table 4: Economic Indices of Growing Rabbits Fed Different Plant Protein Sources

Parameters	T1	T2	T3	T4
Initial weight gain (g)	280.17	271.67	295.50	270.33
Final weight gain (g)	1105.30	1044.30	988.80	1098.50
Total feed intake (g)	2845.36	3055.36	2582.16	2780.40
Total feed intake (kg)	2.85	3.06	2.58	2.78
Cost/Kg feed (¦)	93.88	100.78	96.18	99.63
Total weight gain (g)	838.88	777.28	707.84	828.80
Total weight gain (kg)	0.84	0.78	0.71	0.82
Cost/Kg gain (¦ /kg)	318.52	395.37	349.50	337.77

*Calculated based on the market price of the ingredients (₦/kg) at the time of the experiment (maize = ₦84.00; groundnut cake = ₦100.00; sunflower meal = ₦130.00, bambaranut meal = ₦110; soya bean meal = ₦125.00; fish meal = ₦140.00; groundnut haulm = ₦120.00; wheat offal = ₦60.00; bone meal = ₦55.00; salt = ₦20.00 and premix = ₦1400.00)

T1= Groundnut cake; T2 =Sunflower meal; T3 =Bambaranut meal and T4 =Soya bean meal

Conclusion and Application

The result revealed that

1. Rabbits fed different plant protein sources had no adverse effects on growth and economic performance.
2. Feeding rabbits with T1 (groundnut cake) diet had better economic indices compared to other diets.

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