REPLACEMENT VALUE OF AFRICAN LOCUST BEAN (*Parkia biglobosa*) FRUIT PULP FOR MAIZE IN WEANER RABBITS DIET

Mohammed S[1*], Ijaiya A.T[2], Ayanwale B.A[2], and Kudu Y.S[2]

[1]Niger State Agricultural and Mechanization Development Authority Zone II, Kuta Niger State
[2]Department of Animal Production Federal University of Technology, Minna Niger State, Nigeria.
*Corresponding author: mohammedsani90042@gmail.com
Phone number – 08036389573, 08070426419

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Abstract

A feeding trial of 84 days was conducted to assess the replacement value of African Locust bean fruit pulp for maize in weaner rabbits diet. Five diets were formulated, such that 100% maize and 0.00% fruit pulp of African fruit pulp at (T1), 75% maize and 25% inclusion of African locust bean at (T2), 50% maize and 50% African locust bean pulp as (T3), 25% maize and 75% African fruit pulp at (T4) while (T5) contain 100% fruit pulp of African locust bean and 0.00% maize respectively. Seventy five (75) weaner rabbits (5-6wks old) with average initial weight between 610.67g -622.60g were randomly allocated in a complete randomized design (CRD) experiment to the five diets with fifteen (15) weaner rabbits in each treatment which were subdivided into three (3) replicates having five (5) weaner rabbits in each replicate. The weaner rabbits were housed in individual cage compartment. Proximate composition of the experimental diets fed to weaner rabbits carried out indicated that T1 had dry matter content of 93.28 %, crude protein of 19.80 % and also 12.41 % of crude fiber. Ether extract was higher in T5 with 8.48 %, while nitrogen free extract contained in T3 had the highest value of 51.17 %. However ash content in T5 has the highest value of 7.83 %. The metabolizable energy in all the dietary treatment shows that T5had the highest value of 3013.21 ME/Kcal/Kg. Data were collected on daily feed intake and weekly weight. Feed conversion ratio, protein efficiency ratio, energy efficiency ratio, nutrient digestibility and feed cost benefit ₦ (kg) were calculated. Weaner rabbits fed 75% maize and 25% African fruit pulp (T2) consumed more feed and significantly gained more weight P<0.05 than those fed the other diets. Feed conversion ratio, protein efficiency ratio and energy efficiency ratio were not significantly (P>.0.05) influence by the treatment diets. Average feed cost of production with inclusion of maize was estimated at ₦311.25 in T1 while the African locust bean fruit pulp inclusion was ₦161.81in T5, a cost difference of ₦149.44, this resulted to a progressive reduction in the cost treatment of feed with increase in the level of fruit pulp of African locust bean meal. The results of this study indicated that when 25% fruit pulp of African locust replaced maize, the rabbits performed better than the control diet and also of more economical option.

Keywords: Fruit pulp, weaner rabbits, diet, proximate, metabolizable.

INTRODUCTION

There is an estimate of an annual five to seven percent growth rates for meat consumption, such increase cannot be met easily by large animals like sheep and cattle because of their slow production cycle, they may however be met by short cycle animals such as rabbits, poultry and pigs. The growing demand for maize in the last few years for both human and livestock consumption has pushed its market price to an alarming rate and that has directly affected the production cost of farm animals particularly the non –ruminants.(Igwebuike *et al*., 2003). The fruit pulp is obtained from the locust bean tree. The African Locust bean, (*Parkia biglobosa*) is a perennial tree. It grows in the savanna region of West African up to the edge of the Sahel zone. The fruit of the plant is straight or sickle shaped 15.6cm -31.20cm long and 2.6cm broad with thick waxy margin. When dried it is light brown with black seed embedded in yellowish mealy tasting pulp (Edigwe *et al*., 2012). The study herein conducted is to evaluate the replacement value of African locust bean fruit pulp for maize in weaner rabbits diet.

MATERIALS AND METHOD.

Experimental site – The experiment was carried out at the Rabbit unit of Animal Teaching and Research Farm, located at Gidan Kwano, Federal University of Technology Minna, Niger State.

SOURCE OF EXPERIMENTAL INCREDIENTS – Pulp of locust bean was purchased at Dandaudu village 56km away from Minna. Five dietary treatment were formulated at 16% crude protein requirement

with energy level of 2884.16(Kca/kg) for the rabbits using Pearson square method of feed formulation. Scwartz and Allen (2012).

EXPERIMENTAL DESIGN

A total of seventy five (75) rabbits of mixed sexes and breeds (New Zealand and chinchilla) were randomly allotted to five treatment groups as T1, T2, T3, T4, and T5 with three (3) replicate each, containing (5) rabbits in each replicate.

MANAGEMENT OF EXPERIMENTAL RABBITS.

Rabbits were kept in hutches made up of wood and mesh wire, with height of 60cm, and width 40cm. Hutches were enclosed in a house under intensive system were the floor of the house is cemented on the. All hutches and house were disinfected before commencement of the experiment work. (Olomu, (2008)

DATA COLLECTION AND ANALYSIS

Initial weight of weaner rabbits were taken at the first day on commencement of the experiment. Formulated feed were weighed each morning on daily basis and fed to rabbits in each treatment. Left over feed were weighed the following morning and feed intake obtained. by difference. Initial body weights of all the weaner rabbits were obtained on the first day of commencement of the experimental work, while the weekly body weight were obtained by weighing the weaner rabbits at the end of each week

Table 1 Feed composition and calculated nutrients of experimental diets fed to rabbits at weaner stage.

INGREDIENT (%)	T1 100:00	T2 75:25	T3 50:50	T4 25: 75	T5 100:00
Maize	60.74	45.56	30.37	15.18	00.00
Locust bean fruit pulp	00.00	15.18	30.37	45.56	60.74
Soyabean meal	24.61	24.61	24.61	24.61	24.61
Rice husk	10.00	10.00	10.00	10.00	10.00
Bone Meal	3.00	3.00	3.00	3.00	3.00
Lysine	0.30	0.30	0.30	0.30	0.30
Methionine	0.80	0.80	0.80	0.80	0.80
Salt	0.30	0.30	0.30	0.30	0.30
*Premix	0.25	0.25	0.25	0.25	0.25
Total (kg)	100.00	100.00	100.00	100.00	100.00
Calculated nutrients					
Crude Protein	17.01	17.25	17.49	17.72	17.012
Crude Fibre	10.36	11.09	11.82	12.55	13.28
ME (Kcal/Kg)	2884.16	2788.22	2792.22	2796.22	2648.87
Protein: calorie Ratio	1:149	1:146	1:143	1:139	1:137
Calcium	1.40	1.45	1.47	1.49	1.51
Phosphorous	1.03	1.03	0.99	0.99	0.79
Methionine	1.01	1.00	0.98	0.97	0.96
Lysine	0.87	0.88	.088	0.88	0.89
Ether Extract	0.23	0.21	0.31	0.28	0.22

* = The premix provides nutrients kg^{-1}: Vit. A, 500 IU; Vit. D_2,1500 IU; Vit. E 3, IU; Vit. K,2 mg; Niacin, 15 mg; Vitamin B_{12},0.8 mg;Riboflavin, 3 mg; Pantothenic, acid 6 mg; Chlorine, 3 mg; Folic acid, 4 mg; Manganese, Iodine, 1.0 mg; Cobalt, 1.2 mg; 8 mg; Zinc, 0.5 mg.

Kg = kilogram

ME = Metabolizable energy

Kcal = Kilo calorie

Table 2 Proximate Composition and Calculated Energy Values of Experimental Diets Fed to Weaner Rabbits

Nutrient	T1	T2	T3	T4	T5
Dry matter (%)	93.28	92.22	91.58	92.42	92.10
Crude protein (%)	17.41	16.68	16.01	16.44	15.85
Crude fibre (%)	12.71	10.44	11.26	10.74	10.47
Ether extract %	5.19	7.21	7.97	8.26	8.48
Nitrogen free extract (%)	51.14	50.30	51.17	49.79	49.47
Ash (%)	6.83	7.59	7.17	7.19	7.83
Metabolizable Energy (ME/Kcal/Kg)	2947.58	2915.82	2953.02	2963.02	3013.21

% - Percent, T1- 100 % Maize and 0.00 % Fruit pulp of African locust bean.
T2 = 75 % Maize and 25 %, Fruit pulp of Africa locust bean,
T3 = 50 % Maize and 50 % Fruit pulp of Africa locust bean,
T4 = 25 %, Maize and 75 % Fruit pulp of Africa locust bean,
T5 = 100 % Fruit pulp of Africa locust bean and 0.00 % Maize,
ME = Metabolizable energy,
Kcal = Kilo calorie,
Kg = Kilogram

Table 3 Performance characteristics of weaner rabbits fed inclusion levels of dried fruit pulp of African locust bean

Treatment	T1	T2	T3	T4	T5	±SEM	LS
Average initial weight (g)	610.67^{a}	616.67^{a}	622.00^{a}	622.00^{a}	618.67^{a}	25.9	NS
Average final body weight (g)	1508.33^{ab}	1561.67^{a}	1413.33^{c}	1396.67^{c}	1455.67^{bc}	20.06	**
Average Weight gain (g)	897.67^{a}	944.00^{a}	791.33^{a}	774.67^{a}	839.00^{a}	38.86	NS
Average daily weight gain (g)	10.69^{a}	11.23^{a}	9.43^{a}	9.22^{a}	9.96^{a}	0.46	NS
Total Feed intake (g)	3603.33^{a}	3631.66^{a}	3609.83^{a}	3377.00^{a}	3375.10^{a}	165.27	NS
Average Daily Intake (g)	42.90^{a}	43.23^{a}	40.59^{a}	40.20^{a}	40.17^{a}	2.18	NS
Feed Conversion Ratio	4.06^{a}	3.75^{a}	4.56^{a}	4.40^{a}	4.03^{a}	0.3	NS
Protein Efficiency Ratio	2.22^{a}	2.36^{a}	2.45^{a}	2.22^{a}	2.31^{a}	0.11	NS
Energy efficiency Ratio	1.31^{a}	1.35^{a}	1.33^{a}	1.24^{a}	1.21^{a}	0.06	NS
Cost/Weight Gain (₦ /Kg)	311.25^{a}	253.25^{ab}	206.21^{ab}	192.8^{bc}	161.81^{c}	21.04	**
Mortality %	0.00^{a}	0.00^{a}	0.00^{a}	0.20^{a}	0.20^{a}	0.13	NS

^{abc} Means in the same row with different superscript are significantly different
T1 = 100 % Maize and 0.00 % Fruit pulp of African locust bean,
T2 =75 % Maize and 25 %, Fruit pulp of Africa locust bean,
T3 = 50 % Maize and 50 % Fruit pulp of Africa locust bean,
T4 -=25 %, Maize and 75 % Fruit pulp of Africa locust bean,
T5 =100 % Fruit pulp of Africa locust bean and 0.00% Maize.
SEM = Standard error of mean, LS – Level of significance,
** = Significant at ($P < 0.05$),
NS = Not Significant ($P > 0.05$),
g = gram

RESULTS AND DISCUSSION

Rabbits fed 25% replacement level of fruit pulp of African locust bean diet had a higher feed intake and with a significant (P<0.05) weight gain than diet containing 75% and 50% levels respectively. This result agrees with Gernah *et al*., (2007) that low level of sweetness in the pulp yield a higher intake at 25% inclusion compared to the increased level of 50% and 75%. The high average weight recorded in 25% replacement level could be as a result of high level of feed intake by the rabbits in the treatment, this result agrees with Osagie (2011) that weight gain is directly related to feed intake, while low growth rate in diet 4 could be as a result of low intake of feed. The feed conversion ratio did not show a significant different (P>0.05) in all the dietary levels. Diet 2 shows lowest value, this is in agreement with the work of Okah (2004) who reported that the higher the weight gain per unit feed consumed, the lower the value of feed efficiency obtained. Protein and energy efficiency ratio did not show a significant difference (P>0.05) in all the diet. The ₦311.25 cost of fruit pulp of African locust bean, and maize ₦161.81gave rise to a cost differential of₦149.44, this resulted to reduction in the cost of feed as level of fruit pulp of African locust bean meal is increased ((Kwari and Igwebuike 2010)

CONCLUSION AND RECOMMENDATION

The result of this study reveal that fruit pulp of African locust bean could replace maize at 25% level for weaner rabbits diet without adverse effect on their performance. This level of replacement had less cost than maize based diet. However the effect of dietary fruit pulp of African locust bean on the performance of rabbits depends on the nutrient profile. The levels of maize in the reference diets might also influence performance of the rabbits.

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