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Growth Performance and Cost Implication of Feeding Grower Rabbits with Toasted *Senna occidentalis* Seed Meal

R.J. Wafar[1]and L.I. Tarimbuka[2]
[1]Department of Animal Production and Health, Federal University Wukari, PMB 1020, Taraba State, Nigeria;
[2]Department of Animal Health and Production Technology, Adamawa State
College of Agriculture, PMB 2088, Ganye, Nigeria
Corresponding author: R.J. Wafar: E-mail: wafar@fuwukari.edu.ng; Phone: 08066320686

Abstract
This study was conducted to determine the effect of feeding toasted sickle pod seed meal (TSSM) on the growth performance and its cost implication on grower rabbits. Forty rabbits were allotted to five dietary treatments of eight rabbits per treatment and replicated four times with 2 rabbits per replicate in a completely randomized design (CRD). Five experimental diets were compounded using TSSM at 0%, 2.5%, 5% 7.5% and 10% inclusion levels designated as treatments 1, 2, 3, 4 and 5, respectively. The result of growth parameters evaluated were not significantly ($p>0.05$) different across the dietary treatments as the level of TSSM increased in the diets. Total feed intake (TFI) ranged from 3201.20 to 3235.40g per rabbit while the total weight gain (TWG) varied from 930.00 g in T3 to 936.67g in T4.The results of the economic analysis showed that the cost of feed per kg produced decreased progressively as the levels of TSSM increased in the diets, while the cost per kg weight gain also declined from ₦219.77 in T1 to ₦89.41 in T5.It was concluded that feeding rabbits with TSSM up to 10% inclusion has no adverse effect on growth performance and has low cost implication on cost of feed per kg producedand feed cost per kg gain.

Keywords: Rabbit, growth, performance, cost implication, rabbits

Introduction

High cost of conventional feedstuffs most especially protein sources is a major factors affecting rabbitproduction in the tropics despite its immense potentialsand good attributes such as high growthrate and efficiency in converting feeds to meat,short gestation period, high prolificacy andrelatively low cost of production (Ani and Ugwuowo,2011). A possible solutionto this problem is to explore alternative proteinsource, which is cheap and locally available.One of the alternative sources considered in thisstudy is sickle pod seed meal. Sickle pod **(***Senna occidentalis)* belong to the *leguminosae* family, distributed throughout the tropical and subtropical regions of the world (Lar and Gupta, 1973). It ismostly found in an open pasture and in fields (Ibrahim *et al.*2015).The raw seed on dry matter basis contain 29.54% crudeprotein as reported by Ingweye *et al.* (2010). Studies conducted on the use of rawand soaked sickle pod seed resulted in decreasein feed intake, total weight gain and impairednutrient utilization in rabbits and broiler chicken.However,there is scanty information on the use of toastedsickle pod seed meal in rabbit production.

Therefore, this study was carried out todetermine the effects of toasting sickle pod seed meal on the growth performance and its cost implication on grower rabbit.

Materials and Methods

The study was conducted at the Rabbit ResearchUnit of the Department of Animal Production andTechnology, College of Agriculture, Ganye Adamawa State. The studyarea lies between Latitude 8.26' and 11.98'Northof the Equator and Longitude 12°3' East of the Greenwich Meridian (Adebayo, 1999). Sickle pod seeds were sourced within the studyarea, cleaned and subjected to toasting. Toastingwas achieved by constant stirring the seed for 30 minutes in a metallic frying pan to maintainuniform heating until the seed turns to lightbrown, allowed to cool then milland tagged as toasted sickle pod seed meal (TSSM).

Forty rabbits with an initial average weight of 709±1.89g were procured within study area andassigned tofive dietary treatments. Each treatment was replicated four times with two rabbits perreplicate in completely randomized design. The rabbits were housed in cages, fitted with feeders and drinkers to prevent spillage and feed wastage. Five experimental diets was compounded using TSSM. Diet1 served as the control with 0% TSSM while diets, 2, 3, 4 and 5 contains 0%, 2.5%, 5%7.5% and 10% designated T1, T2, T3, T4 and T5respectively as shown in Table 1.The rabbits were offered experimental diets and water *ad libitum* for the period of 56 days.

They were weighed at the beginning of the experiment and subsequently on a weekly basis. Parameters measured include total weight gain, total feed intake, andfeed conversion ratio (FCR).The proximate composition of the raw and toasted sickle pod seed meals, experimental diets and anti-nutritional factors were determined using the standard procedure of analysis described by (AOAC, 2002).

Data collected were subjected to one way analysis of variance incompletely randomized design (Steel and Torrie, 1980) and means were separated using Duncan's Multiple RangeTest at the $p<0.05$ level (Duncan, 1955).

Table 1 Ingredient composition of experimental diets

	Inclusion levels of toasted sickle seed meal (%)				
Ingredients	0	2.5	5.0	7.5	10
Soybean meal	20.00	19.16	18.00	17.45	16.60
TSSM	0.00	2.50	5.00	7.50	10.00
Maize offals	23.00	21.34	20.00	18.05	17.00
Total	100	100	100	100	100
Determined analysis					
Dry matter	90.95	90.92	90.90	91.00	90.95
Crude protein	18.77	18.52	18.33	18.90	18.20
Crude fibre	8.02	8.24	8.60	8.53	8.20
Ether extracts	7.86	7.17	7.76	7.41	7.88
Ash	7.91	7.23	7.76	7.41	7.88
NFE	57.44	58.84	57.66	58.15	57.64
ME(Kcal/kg)	3370.27	3410.72	3344.79	3293.63	3327.12

maize- 41.00%; cowpea husk – 10.00%; fishmeal – 2.00%; bone meal – 3.00%; salt – 0.50%, premix – 0.50%; Vitamin-mineral premix provider per kg the following: Vit. A 1500 IU; Vit.D3 3000 IU; Vit.E 30 IU; Vit.K 2.5 mg;Thiamine B1 3 mg; Riboflavin B2 6 mg; Pyrodoxine B6 4 mg; Niacin 40 mg; Vit. B12 0.02 mg; Pantothenic acid10 mg; Folic acid 1 mg; Biotin 0.08 mg; Chloride 0.125 mg; Mn 0.0956 g; Antioxidant 0.125 g; Fe 0.024 g; Cu0.006 g; 10.0014 g; Se 0.24 g; Co 0.240 g,

Results and Discussion

The proximate composition of the raw and toasted SSMs is presented in Table 2. The results showed higher Crude Protein (CP), Crude Fibre (CF), ether Extract (EE) and ash values for TSSM. This indicates that the nutrient of sickle pod seed was improved by toasting. The CP values of both raw and toasted sickle pod seed are lower the values of18.46% and 29.54% reported by Ismaila *et al.* (2011) and Ingweye *et al.* (2010).The higher CP level of the TSSMmay be attributed to the processing methods employed. The values of CF and ash are higher than 2.45% and 9.00% reported by Ingweye *et al*. (2010). Differences in the nutrient composition could be as a result of laboratory analysis, processing methods, edaphic factors and climatic factors. All the values for anti-nutritional factors (ANFs) determined decreased as a result of the toasting. This agreed with the findings of John *et al.*(2010) who reported reduction in ANFs when they subjected Sorrel seed to toasting. Reduction in the contents of the ANFs suggests the ability of toasting as an effective method of detoxification sickle pod seed.

The growth performance parameters of grower rabbits fed graded levels of TSSM are presented in Table 3. The result showed no significance ($P>0.05$) in all the parameters evaluated. Total feed intake ranged from 3201.20g for rabbits on T3 diet to 3235.40 g for those on T2 diet, while TWG varied from 930.00 g for rabbits fed T1 and T3 diets to 936.67 g for those on T4 diet. However, final weights and FCR were not influenced by dietary inclusion of TSSM. The non-significant difference observed in the present studyis in consonant with that of (Ani and Okeke, 2003), who fed roasted pigeon pea meal to broilers and reported no significant difference on the broilers performance. However, the finding is also similar to the observation of Kemi (2015) who fed toasted pigeon pea meal to weaner rabbits but negates the finding of Augustine *et al.* (2011) who reported significant decreased in growth performance of rabbits fed up to 10% inclusion of toasted cassia *obtusifolia* seed meal.

The result of average daily weight gain (ADWG) of therabbits fed graded levels of TSSM was higher than the range of 12.27-15.70 g as reported by Kemi (2015).The results of the economic analysis presented in Table 3 showed that the cost of feed per kg produced decreased progressively as the levels of TSSM increased in the diets. The cost per kg gain also declined from ₦ 219.77 in T1 to ₦ 89.41 in T5. Rabbits fed T5 diet showed the lowest cost per kg weight gain. The more TSSM increases in the diets, the less expensive the diet becomes.

Thus, inclusion of TSSM in the diets of growing rabbits reduced the feed cost and feed cost per kg gain. The finding in this study agreed with the report of Wafar and Tarimbukar (2016) who fed non-conventional feedstuffs to rabbits and observed reduction in both feed cost and cost per kg gain.

Table 2: Proximate and anti-nutritional composition sickle seed meal (%DM)

Parameter	Raw	Toasted
Dry matter	94.80	90.80
Crude protein	21.45	30.15
Crude fibre	10.18	17.10
Ether extracts	7.50	8.00
Ash	4.16	11.00
Nitrogen free extracts	46.77	33.25
ME Kcal/kg	3071.41	2988.94
Anti- nutritional factors mg/100g		
Saponin	185.00	40.12
Phenols	137.85	46.35
Tannins	191.14	43.45
Oxalates	83.00	21.64
Phytate	240.00	26.97
Cyanides	6.78	0.63

Metabolizable Energy = ME (kcal/kg) = 37 x % CP + 81 x % EE + 35.5 x % NFE, Calculated according to the formula of Pauzenga, (1985)

Table 3:Growth performance and economics of growing rabbit fed TSSM

	Inclusion levels of toasted sickle seed meal (%)					
Parameter	0	2.5	5.0	7.5	10	SEM
Initial weight (g)	710.67	708.00	710.00	708.33	709.67	7.09^{ns}
Final body weight (g)	1646.70	1650.00	1640.00	1645.00	1642.30	12.30^{ns}
Total body weight gain (g)	930.03	942.00	930.00	936.67	932.63	6.32^{ns}
Average daily weight gain (g)	16.60	16.82	16.60	16.72	16.65	8.21^{ns}
Total feed intake	3228.10	3235.40	3201.20	3213.70	3219.70	10.12^{ns}
Average feed intake	57.67	57.78	57.16	57.38	57.49	5.12^{ns}
Feed conversion ratio	3.47	3.43	3.44	3.43	3.45	1.32^{ns}
Cost of feed/ kg	63.34	52.90	40.67	32.89	25.90	-
Cost of total feed intake(₦/kg)	204.46	171.15	130.19	105.69	83.39	-
Feed cost /kg gain (₦/kg)	219.77	181.68	139.98	112.83	89.41	-

Conclusion.

The study has shown that feeding rabbits with TSSM up to 10% inclusion has no adverse effect on growth performance. Additional advantage recorded was as the level of TSSM meal increases, feed cost and feed cost per kg gain decreases in the diets. Therefore, rabbit farmers are encouraged to use TSSM meals as protein source in the diets of growing rabbits.

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