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Growth Performance, Carcass Attributes and Economics of Production of Rabbits Fed Kola Nut Testa Based Diets

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Abstract

The objective of this study was to assess the growth performance, carcass attributes and economics of production of rabbits fed diets with varying inclusions levels of kola nut testa (KOT) as a replacement for maize. Thirty mixed breed rabbits of mixed sexes were used for this experiment. The rabbits were randomly allotted into 5 treatment groups. Five experimental diets were formulated such that KOT replaced maize at 0, 10, 20, 30 and 40%. Records of feed intake and weight gain were properly taken. The experiment lasted for 8 weeks. Data were analyzed using Analysis of Variance while means were separated using Duncan's Multiple Range Test of SPSS. No significant difference ($P>0.05$) was recorded in all the parameters measured to determine growth performance. The result of carcass characteristics revealed that no significant difference ($p>0.05$) was recorded in the weights of the parameters measured except for the limbs. Cost of feed decreased with increase in KOT inclusion (N139.8-N112.54). Cost of feed (N/kg) weight gain (N1023.61-N583.04); the cost of weight gain (N573.22-N483.92); and total cost (N2143.61-N1523.92) all followed a similar pattern. Cost differential (205.93–440.04) and relative cost-benefit (20.11–43.04%) increased with increase in the level of replacement of KOT. Conclusively, growth performance was not negatively affected and total weight gain was numerically highest at 40% (916.67g). Also, the highest relative cost-benefit was recorded at 40% (28.54%). These prove that KOT is a viable substitute for maize in rabbit diet and it is more economical at 40% replacement level.

Keywords: Carcass, economics of production, growth performance, kola nut, rabbits

Introduction

The importance of rabbit production in the supply of animal protein for man, especially for people of developing countries where the consumption of protein is generally low, cannot be overemphasized. Protein consumption in Nigeria, for instance, is less than 10g per day per caput with only 3.2 g of this from animal source (Abu *et al.*, 2008). Rabbit production can help in solving this problem. Rabbits, besides their high prolificacy and easy to raise attributes, are source of high-quality meat which is high in protein and low in fat. One limiting factor to the production of rabbits, however, is the cost of production.

The cost of feed is the main cause of high cost of production of rabbits. Feed cost amounts to about 60% of the cost of production (Ikani *et al.*, 2001). Conventional feed ingredients which are also directly consumed by man e.g. maize and soya beans are the reasons for high cost of feed. The demand for these ingredients and the resultant competition for consumption between man and livestock have led to the increase in the prices of these ingredients. The numerous uses of maize for human consumption, as animal feed and as input in other industrial activities has made its demand overly high with a consequential rise in price and hence, resulting in high production cost of livestock (Balogun *et al.*, 2016; Aderemi and Wuraola, 2010). This has led to the quest for unconventional ingredients with less or no cost to replace the expensive conventional ones. The aim is to reduce the cost of feed production and subsequently, the total cost of production of livestock (Ojabo *et al.*, 2012). Kola nut testa is the protective covering of the kola nut seed (*Cola nitida*) inside the pod. It is readily available in areas where kola nut is produced and processed and it is, in fact, a by-product of kola nut production.

The objective of this study was to assess the growth performance, carcass attributes and economics of production of rabbits fed diets of varying inclusions of Kola nut testa meal as a replacement for maize.

Materials and Methods

The experiment was carried out at the Rabbit Unit of the Teaching and Research Farm, Adeyemi College of Education Ondo in Ondo state, South-western, Nigeria. Thirty mixed breed rabbits of mixed sexes were used for this experiment. The rabbits were of an average weight of 0.7kg and they were randomly allotted into 5 treatment groups which were replicated 6 times each in a completely randomized design. Each rabbit was housed in a separate hutch in the same cage. The hutches were equipped with feeders and drinkers. The experiment lasted for 8 weeks. The animals were firstly allowed to acclimatize for a period of two weeks before the start of the experiment. The initial weight of each rabbit was taken before introducing them to the experimental diets. The animals were fed and given fresh water twice daily (morning and evening). The cage and the floor of the pen were cleaned daily for the control of disease causing micro-organisms. Kola nut testa was collected from areas of production and sale of kola nut in Ondo town and environs at no cost. The test ingredient was air-dried for two weeks and milled before incorporating into the diets of the animals. Five experimental diets were formulated such that (KOT) replaced maize at 0, 10, 20, 30 and 40%. Records of daily feed intake and weekly weight gain were taken throughout the period of the experiment.

After the 8th week, the animals were starved overnight, weighed and slaughtered. They were stunned before slaughtering and cut into parts for measurement after slaughtering.

Data collected were analyzed using Analysis of Variance (ANOVA) and mean were separated using Duncan's Multiple Range Test (DMRT) of SPSS 2002.

The following formulae were used to determinethe economics of production of the animals

- Cost of Weight Gain (N) = Average Weight Gain (kg) x Cost of Feed N/kg Weight Gain
- Cost of Feed (N)/kg Weight Gain = $\frac{\text{Cost of Feed (N/kg)} \times \text{Average Feed Consumed (kg)}}{\text{Average Weight Gain (kg)}}$
- Relative Cost Benefit (%) = $\frac{\text{Cost of Feed N/kg Weight Gain of Control Diet} - \text{Cost of Feed N/kg Weight of Test Diet}}{\text{Cost of Feed N/kg Weight Gain of Control Diet}} \times 100$
- Total Cost (N) = Total Fixed Cost (TFC) + Total Variable Cost (TVC)
- Cost Differential=Cost of Feed N/kg Weight Gain of Control–Cost of Feed N/kg Weight Gain of Test Diet

Results and Discussion

The result of growth performance of rabbits fed diets with maize replaced with a kolanuttesta meal is presented in Table 1. The result reveals that no significant difference ($p>0.05$) was recorded in the all parameters measured showing that the replacement of maize with akolanuttesta has no deleterious effect on the growth performance of rabbits. This is similar to the report of Jiyaet *al.* (2012) who recorded no significant difference ($p>0.05$) in all the parameters used to measure growth performance of rabbits feddiets of maize replaced with kola nut Husk Meal (KNM) up to 20%. However, total (916.67 g) and daily weight gain (16.37 g) proved to be numerically higher at 40% than in the other treatment groups despite it having the lowest initial body weight (600.00 g). This disagrees with the report of Abioye *et al.* (2006) who recorded a significant decrease ($p<0.05$) in weight gain up to 200 g/kg inclusion of KHM in broiler diet. This can be attributed to the fact that rabbits can easily use protein inside cellulose - rich feeds than poultry (Lebas, 1983). Total (4784.67g) and daily feed consumed (85.44 g) were likewise numerically higher at 40% than in the other treatment groups. From the result, rabbits fed diets with kola nut testa consumed more feed (4054.00 - 4784.67 g) than rabbits that consumed feed with conventional ingredients only (4007.67 g). Although no significant difference was recorded, this result agrees with that of Olalokun and Olalokun (1999) who reported improved body weight gain and feed intake for rabbits fed KHM. Feed conversion ratio is, however, lowest at 20% replacement and highest at 10% replacement of maize with KOT meal.

Table 1: Growthperformance of rabbits fed diets with maize replaced with KOT

Parameter	0	10	20	30	40	SEM	SG
Initial Body Weight (g)	816.67	750.00	733.33	766.67	600.00	93.99	0.59
Final Live Weight (g)	1600.67	1593.33	1583.33	1500.00	1516.67	103.54	0.93
Total Weight Gain (g)	783.33	843.33	850.00	733.33	916.67	150.47	0.90
Daily Weight Gain (g)	13.99	15.06	15.18	12.80	16.37	2.69	0.90
Total Feed Consumed (g)	4007.67	4419.00	4054.00	4638.67	4784.67	367.42	0.51
Daily Feed consumed (g)	71.56	78.91	72.39	82.83	85.44	6.56	0.51
Feed Conversion Ratio	5.55	6.61	4.88	6.55	5.32	1.21	0.80

The result of the carcass characteristics of rabbits fed diets with maize replaced with KOT meal as shown in Table 2 reveals that no significant difference ($p>0.05$) was recorded in final live weight (1.50 – 1.60 kg), slaughter weight (1.38 – 1.50kg), dressed weight (1.07 – 1.13kg), eviscerated weight (0.067 – 0.93 kg), trunk weight (367.60 – 408.47 kg), head (124.20 – 148.40 g/kg), pelt (129.90 – 168.13 g/kg), tail (4.13 – 5.97 g/kg), neck (25.73 – 37.53 g/kg), thigh (264 – 288 g/kg), loin (145.90 – 177.43 g/kg), forequarter (229.30 – 272.97 g/kg), shoulder (102.70 – 127.87g/kg), ribs (125.00 -138.53 g/kg) and carcass length (31.33 – 33.67 cm). The final live weight decreased numerically with an increase in the inclusion of KOT. This can be attributed to a similar trend in the initial weight. Thisresult is also similar to the decrease in weight gain ($p<0.05$) with an increased level of KHM in broiler diets as reported by Abioye *et al.* (2006). This proves that the replacement of maize with KOT has no negative effect on these various parts of the rabbits. However, significant differences ($p<0.05$) were recorded in the weights of limbs and this can be attributed to losses during processing. This is however contrary to the report of Jiyaet *al.* (2012) who recorded no significant difference ($p>0.05$) in the weights of hind limbs of rabbits fed KHM. The result of the economics of production as shown in Table 3 reveals that cost of feed (N/kg) decreased with increase in the inclusion of KOT (N139.81 - N112.54). Cost of feed (N/kg) weight gain (N1023.61-N583.04); cost of weight gain (N573.22- N483.92); total cost (N2143.61- N1523.92) all followed similar pattern. Cost differential (205.93–440.04) and relative cost benefit (20.11–43.04%) increased with increase in the inclusion level of KOT. The best relative cost benefit was however recorded at 40% replacement of maize with KOT meal.

Conclusion

Findings from this study revealed that the growth performance of the experimental rabbits was similar. However, total weight gain was numerically highest at 40% KOT (916.67 g). Also, the highest relative cost benefit was recorded at 40% KOT (28.54%). These prove that KOT is a viable substitute for maize in rabbit diet up to 40%.

Table 2: Carcass characteristics of rabbits fed diets with maize replaced with KOT

Parameter	Percentage Inclusion of KOT					SEM	SIG
	0	10	20	30	40		
Final live weight (kg)	1.60	1.60	1.58	1.50	1.52	0.12	0.87
Slaughter weight (kg)	1.40	1.38	1.50	1.43	1.43	0.13	0.97
Dressed weight (kg)	1.13	1.07	1.13	1.13	1.12	0.93	0.98
Eviscerated weight (kg)	0.90	0.67	0.87	0.93	0.67	0.12	0.39
Trunk weight (g)	370.73	356.70	408.47	367.60	368.33	26.12	0.69
Head (g/kg)	132.63	124.20	148.40	140.60	133.30	10.68	0.59
Pelt (g/kg)	148.43	129.90	154.10	168.13	134.23	20.39	0.69
Limbs (g/kg)	24.43 ^b	29.90 ^{ab}	32.17 ^a	34.00 ^a	30.23 ^{ab}	2.18	0.04
Tail (g/kg)	5.17	5.97	5.30	4.13	5.03	1.61	0.04
Neck (g/kg)	30.33	25.73	29.53	37.53	30.07	5.16	0.62
Thigh (g/kg)	271.40	264.97	276.97	288.73	288.77	24.90	0.94
Loin (g/kg)	146.07	145.90	177.43	163.10	150.23	13.35	0.43
Forequarter (g/kg)	239.30	229.30	258.00	269.93	272.97	30.20	0.81
Shoulder (g/kg)	107.80	102.70	120.93	127.87	107.57	8.27	0.24
Ribs (g/kg)	125.00	127.07	135.53	138.07	130.90	12.09	0.93
Carcass Length (cm)	32.33	31.33	31.33	33.00	33.67	0.83	0.27

^{ab}: Mean values with different superscript along the same row indicate significant difference ($p < 0.05$). SEM: Standard error of Mean

Table 3: Economics of production of rabbits fed diets of maize replaced with KOT

	Percentage Inclusion of KOT				
	0	10	20	30	40
Purchase Price (N)	1450.00	1520.00	1500.00	1580.00	1600.00
Average Weight Gain (kg)	0.56	0.70	0.69	0.76	0.83
Average Feed Consumed (kg)	4.1	4.3	4.0	4.1	4.3
Cost Items					
Cost of Cage Maintenance (N)	250	250	250	250	250
Cost of Feed (N/kg)	139.81	133.11	126.17	119.35	112.54
Cost of Feed (N)/kg Weight Gain	1023.61	817.68	731.42	643.86	583.04
Cost of Weight Gain (N)	573.22	572.38	504.68	489.33	483.92
Total Cost (N)	2143.61	1917.68	1801.42	1743.85	1523.92
Cost Differential	-	205.93	292.19	379.75	440.04
Relative Cost Benefit (%)	-	20.11	28.54	37.10	43.04

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