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REPLACEMENT VALUE OF KOLANUT HUSK MEAL FOR MAIZE IN RABBIT DIETS

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Target Audience: Poultry feed millers, nutritionist and poultry farmers

ABSTRACT

Forty - five (45) weaner rabbits were fed on diets containing 0, 25, 50, 75 and 100% kolanut husk meal (KHM). Kolanut husk meal was incorporated to replace maize in a nine week feeding trial. KHM at 100% dietary level depressed feed intake, growth rate, feed conversion ratio, apparent nitrogen retention and protein efficiency ratio, while 25% and 50% KHM replacement level improved feed conversion ratio, growth rate, nitrogen retention, protein efficiency ratio and reduce the cost per kilogram live weight gain of rabbits relative to control diet.
Hence, kolanut husk meal could replace up to 50% maize in the diets of rabbits.

Key words: Kolanut husk meal, maize, rabbits, diets, replacement value.

DESCRIPTION OF PROBLEM

Feed millers and livestock farmers complained about high cost of finished feed of which maize consistutes 60% (1). Therefore, high cost of maize definitely affects the price of finished feed and livestock products. As a result of this, efforts have been geared towards finding alternative feed resources which can replace certain proportion of maize in livestock ration with the ultimate aim of producing needed animal protein at the lowest possible cost for human nutrition.

Crop wastes and agro-industrial-by-products have proved useful in this respect. They have been exploited to replace reasonable amount of maize in both livestock and poultry feeds without any detrimental effects on their performance.

These crop wastes and agro-industrial-by-product are brewers spent grains, brewers dried grains, wheat bran, rice offals, cocoa husk meal, kolanut husk meal. They have proved to be useful as a partial replacement for

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maize in broilers (1,2); rabbits (3). laying hens (4); sheep (5). Kolanut husk and kola testa (essential component of kola fruit) have been shown to share the same potentials as cocoa husk (6).

About 2 million tonnes of kola fruits are produced annually in Nigeria and this represent 70% of total world kolanut production (7). A freshly harvested matured kola fruit consists of 44.3% pod husk, 14.3% testa and 41.4% nut (6). Apart from the kolanut which is the only part regarded as the most economic, the testa and the husk are considered wastes on kola farms in Nigeria (8: 9).

Few literature exist on the feeding value of kolanut husk (KH). It was suggested that KH could suitably substitute up to 60% maize in layers mash with concomitant increase in profit margin (10). It was shown that feeding of KH up to 14% inclusion level plus 30% brewers spent grains (BSG) in conventional rabbit diet is technically feasible (7). The crude protein of kolanut husk (KH) is higher than cocoa husk (CH) and maize while KH has lower crude fibre than (CH) (11).

In view of the fact that rabbit can utilise crop wastes and agro-industrial-by-products efficiently with minimum cost of production, there is a need to establish optimal inclusion of kolanut husk in rabbit's diet.

MATERIALS AND METHODS

Kolanut husks were collected from the kola unit of Cocoa Research Institute of Nigeria (CRIN), Ibadan. They were sundried and ground into meal. The kolanut husk meal (KHM) was later incorporated into the ration. Five isonitrogenous diets were formulated with diet A (having no KHM) as the control, while diets B, C, D, and E, contained 25, 50 , 75 and 100% KHM respectively as shown in Table 1.

Forty five Newzealand white rabbits, eight week old were randomly alloted to the five dietary treatment groups, each with three replicates consisting of three rabbits per replicate in a completely randomised design. The animals were housed individually in a cage of average height of 90cm from the floor. They were weighed at the commencement of the trial and weekly thereafter until the end of the nine week experimental period. The record of daily feed intake of the animals were also taken. They were fed twice a day. Clean, cool water was supplied ad-libitum.

At the end of the trial, two rabbits per replicate i.e six rabbits per treatment were randomly selected, weighed and put in metabolic cages to determine the feed intake and faecal output. A three day acclimatization period was allowed prior to four days collection period. Faecal and urinary outputs of each animal were collected totally on daily basis and weighed. The wet faecal samples were oven dried at 80°C to constant weight for 48hours. The dried faecal samples were bulked for the four day collection period, ground and stored for laboratory analysis. The urinary outputs were weighed in a measuring cylinder and aliquots were kept in a screw capped bottle, 0.1N H_2SO_4 was added to curtail bacterial action. The urinary samples were refrigerated.

Table 1 Composition of experimental diets (kg / 100kg)

Ingredient	Control	25%	50%	75%	100%	KHM
Maize	40.45	31.79	8.98	14.48	-	
KHM	-	10.11	20.23	30.34	40.45	
Soyabean meal	10.80	9.35	22.04	6.43	10.80	
Blood meal	2.00	2.00	2.00	2.00	2.00	
Palm kernel cake	20.00	20.00	20.00	20.00	20.00	
Maize bran	20.00	20.00	20.00	20.00	20.00	
Oyster shell	2.00	2.00	2.00	2.00	2.00	
Bone meal	1.50	1.50	1.50	1.50	1.50	
Palm oil	2.00	2.00	2.00	2.00	2.00	
Methionine	0.25	0.25	0.25	0.25	0.25	
Lysine	0.25	0.25	0.25	0.25	0.25	
Salt	0.50	0.50	0.50	0.50	0.50	
Vit/ min premix	0.25	0.25	0.25	0.25	0.25	
Proximate composition						
Crude protein	17.35	18.95	18.75	17.25	17.15	9.49
Crude fibre	9.87	8.76	9.58	10.02	10.16	10.61
Ether extract	5.28	4.97	5.18	6.23	5.68	1.01
Crude ash	8.87	11.12	11.26	9.76	10.26	6.12
Nitrogen free extract	50.25	46.98	47.24	48.42	49.21	72.77
Gross energy (kcal / kg	3128	3262	3124	3187	3312	5562

*Premix Pfizer products at recommended rate to meet the requirement for micro nutrients.

Kolanut husk meal, experimental diets and faeces were analysed for proximate composition, while nitrogen was determined in urinary samples. All data were subjected to analysis of variance and differences in treatment means were separated at 5% level of probability (12).

RESULTS AND DISCUSSION

The results of proximate composition for KHM (Table1) agreed with values reported (6) and (10) except for the crude protein which was lower than 13.86% CP as reported (7). The crude fibre content of KHM is close to the value obtained (9) but lower than values reported (7). This could be attributed to the differences in the variety of Cola used in this study. Cola nitida as against Cola accuminata used in the study 7. This implies that

Cola accuminata is more fibrous and contain higher crude protein contents than Cola nitida.

Table 2 shows the performance of rabbits fed graded levels of KHM. Feed intake of the rabbits on control, 25, 50 and 75% KHM-based diet did not differ significantly (P>0.5). However, there were differences between these values and values obtained for 100% KHM- based diet. Also there was a linear reduction in feed intake at each incremental dietary level of KHM. This observation is contrary to the report (7) who stated that inclusion of KHM and BSG significantly ((P<0.05) increased feed intake over the control group. The differences could have been caused by additional supplemental influence of BSG and low dietary level of KHM in the rabbit ration. Also the variety of kola husk could have accounted for this difference as cola accuminata was used (7).

Table 2. Performance of rabbits fed graded levels of KHM

Parameters g / rabbit	0	25	50	75	100%	SE
Daily feed intake	75.68a	74.29a	73.47a	68.67a	21.46a	4.02
Daily weight gain	14.11ab	15.09a	16.81a	10.18b	2.86c	0.96
Feed conversion ratio	5.44 b	4.93b	4.42b	6.81ab	7.50a	0.27
Mortality	-	-	-	-	2.00	
Cost of feed (N / kg)	20.33	18.19	20.47	13.89	13.57	
Feed cost per kg Liveweight gain N / kg	110.59	89.68	90.47	94.59	101.91	

abc Means along the same row with different superscripts are significantly different (P< 0.05).

The lower feed consumption of rabbits on 100% KHM based diet might not only be due to higher gross energy which probably reduce feed intake and consequently nutrient intake (13, 14) but could also be due to bitter taste, poor palatability and acceptability of the feed (caused by KHM in the feed) by rabbits. Lower feed intake coupled with high mortality recorded among the rabbits fed 100% KHM-based diet attested to this fact.

No significant daily weight gain (P>0.05) was observed between animals on control, 25 and 50% KHM-based diets. Similarly, there were no significant differences (P>0.05) between daily weight gain of animals on control, 25 and 75% KHMbased diets. While significant differences (P<0.05) in daily weight gain existed between rabbits on 50, 75 and 100 KHM-based diets. Significantly lower growth rate (P<0.05) was recorded for animals on 100% KHM-based diet relative to the ones on control and other KHM supplemental diets. However, rabbits on 50% KHM-based diet had significant (P<0.05) high growth rate than rabbits on 75 and 100% KHM-based diets.

Feed conversion ratio (FCR) of rabbits on control, 25 and 50% KHMbased diet were similar (P>0.05). Also, there were no significant (P>0.05) feed conversion ratio between animals on 75 and 100% KHMbased diets. However, significant lower FCR (P<0.05) were recorded for 100% KHM-based diet. The implication of this was that KHM could be utilised efficiently by rabbits up to 50% dietary inclusion level beyond which depression in growth rate occurs. Depressive influence of KHM on feed intake and growth was highly conspicuous at highest dietary replacement levels. This might be due to the fact that lower feed intake of animals on 100% KHMbased diet, diluted concentration of available nutrients coupled with high level of kolatin and caffeine in 100% KHM could be responsible for poor feed conversion ration and low growth rate (15).

Table 3 shows apparent nitrogen retention of the rabbit on replacement levels of KHM. Dry matter intake of rabbits on control, 25% and 50% KHM-based diets were similar (P>0.05). Although, rabbits on 75% KHM-based diets had similar (P>0.05) dry matter intake with the control and 25% KHM but it was significantly different (P<0.05) from dry matter intake of animals on 50% KHM-based diet.

Table 3. Apparent Nitrogen Retention (%)

Parameters	Treatments				
	0	25	50	75	100%
Daily DM intake (g / DM)	78.56ab	76.60ab	81.20a	60.74b	29.94a
Apparent dry matter digestibility	71.58b	85.70a	86.45a	70.10b	26.08b
Nitrogen retention	66.89a	85.06a	85.06a	65.16a	21.76b
Protein efficiency ratio	1.03a	1.04a	1.10a	0.97a	0.56b

No significant differences (P>0.05) existed between treatments on apparent dry matter digestibility, nitrogen retention and protein efficiency ratio (PER). A progressive reduction in PER at each incremental dietary replacement level were observed. No significant differences (P>0.05) between control, 25, 50 and 75% KHM based diets showed that protein were efficiently metabolised for growth in all these treatments, while at 100% KHM level, protein metabolism was probably hindered.

The high cost per kilogram of 50%KHM-based feed could be attributed to high dietary level of soyabean meal used than in other diets, while high cost of control diet could have been caused by high level of maize used. However, cost per kilogram live weight gain favoured 25 and 50% KHM based diets.

CONCLUSION AND APPLICATION

1. Body weight gain, feed intake, feed conversion ratio of experimental rabbits were depressed at 100% KHM- supplemental level.
2. High dietary level of KHM in rabbit's diet resulted in low nitrogen retention, poor protein efficiency ratio and high mortality of animals.
3. KHM could be utilized efficiently up to 50% in rabbit's diet beyond which depression in performance occurs.
4. 25 and 50% KHM dietary levels improved cost per kilogram liveweight gain of rabbits.

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