(Short communication)

Effects of feeding graded levels of kolanut husk meal on the performance of cockerels

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Abstract

Eighty black Nera cockerel chicks were randomly allotted to four dietary treatments containing 0, 10, 20 and 30% kolanut husk meal (KHM) for twelve weeks. Significant differences ($p < 0.05$) in feed intake, weight gain and feed conversion ratio were observed.

Dietary inclusion of KHM depressed ($P < 0.05$) growth rate, feed conversion ratio and nutrient utilization of cockerel birds. There were linear reduction ($p < 0.05$) in nitrogen retention and apparent crude fibre digestibility (ACFD) of cockerels birds at each incremental KHM dietary levels. This indicated that KHM could be efficiently utilized by cockerels up to 20% dietary level above which there was depression in growth rate occurs.

Keywords : Cockerels, kolanut husk, performance.

Introduction

Expansion of the poultry industry depends to a large extent on the availability of good quality feed in sufficient quantity at a price that producers can afford. This is particularly true of the intensive poultry enterprises whose performance depends almost entirely on the use of balanced concentrate rations.

The scarcity of conventional sources of protein and energy is largely responsible for the present high price of finished feed. Nigeria produces large quantities of agricultural and agro industrial by-products, which serves as alternative feed

resources to conventional feed ingredients and have proved valuable in supporting performance of livestock and poultry birds (Babatunde and Oluyemi, 2000) .

Among such agro by-products are cocoa husk meal, cocoa testa, kolanut husk meal and kola testa. It is estimated that Nigeria produces about two (2) million tonnes of kolanut pods annually in the rain forest zone and this represent 70% of total world kolanut production (Oluokun and Olalokun, 1999). Few information exist in literature on the feeding value of the kolanut pod meal. Olubamiwa *et al.* (2000) suggested that kola husk (KH) could suitably substitute up to 60% maize in layer's mash, while Hamzat and

Babatunde (2001) recommended 20% KH inclusion in broiler's diets.

Some of the limiting factors associated with crop residues and agro industrial by-products as animal feeds include: procurement, storage, poor feed intake, high fibre content, toxic substances, low digestibility, nutrient contents and subsequent low animal performance (Adegbola and Oduozo, 1992). High percentage level of inclusion of these highly fibrous by-products in non-ruminant diet has always been a bone of contention among nutritionists considering the effect of crude fibre existence in these by-products.

Hence, the current investigation was undertaken to assess the value of kolanut husk meal fed at varied levels of inclusion on the performance of cockerel birds. The main objective of the study was to determine the optimal replacement level of kolanut husk for maize in cockerel's diet.

Materials and Methods

Eighty chicks were randomly allotted to four dietary treatments containing (A) 0, (B)10, (C) 20 and (D) 30% kola nut husk meal for twelve weeks in a completely randomized design experiment. Each treatment was replicated twice with 10 birds per replicate. Water and feed were given twice daily throughout the experimental period and the experimental birds were weighed weekly until the experiment was terminated. Well-dried kola nut husk was milled and incorporated into experimental diets at 0, 10, 20 and 30% inclusion rates.

The digestibility study was carried out at the end of the experiment i. e. at 12 weeks of age. Four birds per treatment (i.e. two per replicate) were randomly selected and transferred to metabolic cages for three days adaptation period, followed

by four days of total collection of droppings. They were oven dried and the representative samples taken for analysis.

Proximate analyses of experimental diets and faecal samples were done using A.O.A.C. (1990) method. The experimental data were subjected to analysis of variance and Duncan multiple range test was used to separate differential treatment means (Duncan, 1955).

Results and Discussion

Results showed that significant differences ($p < 0.05$) were observed with feed intake, weight gain and feed conversion ratio (Table 3). Progressive increment in feed consumption were recorded as dietary inclusion of KHM increases along the treatments. Birds on control diet had the lowest feed intake (6433.80g/bird). The increased feed consumption of cockerel bird could be attributed to an attempt to satisfy energy requirement due to caloric dilution of the diets by KHM (Hill and Dansky, 1954; Summers and Leeson, 1986; Oluokun and Olalokun, 1999). The improved voluntary feed intake of birds on KHM diets contradicted the report of Bate – Smith (1973) that presence of tannin in KHM provokes an astringent reaction in the mouth of the birds thereby reducing voluntary intake of KHM feeds. There were no significant differences ($P > 0.05$) between 10 and 20% KHM birds. Also feed intake of 20% and 30% KHM diets were similar ($P > 0.05$). There was significant ($P < 0.05$) influence of KHM on growth rate of cockerels as evident from depressed weight gain. There was a direct depression ($P < 0.05$) of weight gain proportionately with incremental dietary KHM level. Significant higher ($P < 0.05$) weight gain and feed conversion ratio were observed in control birds relative to other treatments. No significant weight gain and feed conversion ratio ($P > 0.05$) existed between birds on 10 and 20% KHM – based diets, while significantly lower

Table 1 Gross composition of experimental diets

Ingredients	Diets			
	A	B	C	D
Maize	50.66	40.05	30.43	20.79
KHM	-	10.00	20.00	30.00
Soyabean meal	16.24	15.85	15.47	15.11
GNC	10.00	10.00	10.00	10.00
PKC	6.00	6.00	6.00	6.00
Fish meal	3.00	3.00	3.00	3.00
Wheat offal	10.00	10.00	10.00	10.00
Oyster shell	1.00	1.00	1.00	1.00
Palm oil	-	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25
*Vit / min mix	0.50	0.50	0.50	0.50
Methionine	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Calculated analysis				
Crude protein (%)	20.73	20.57	20.50	20.42
Metabolizable energy (kcal / kg)	2758	2769	2731	2693

Vitamin / mineral premix supplied per kg diet : Vit A 10,000IU; Vit E 10mg; Vit B₁ 1.6mg; Vit B₂ 3.2mg; Vit B₆ 2.4mg; Vit B₁₂ 8mg; folic acid 0.6mg; Panthothenic acid 14.4mg; Choline chloride 80mg; Mg 0.25mg; Mn 120mg; Fe 48mg; Cu 0.4mg; Se 100mg

Table 2 Proximate analysis of kola nut husk meal and experimental diets

Parameter (%)	KHM	A	B	C	D
Dry Matter		90.82	91.19	89.73	91.26
Ash	6.12	7.96	8.03	8.18	8.09
Crude Protein	9.49	17.73	17.39	16.81	15.98
Ether Extract	1.01	3.43	3.51	3.87	3.93
Crude Fibre	10.61	6.51	6.83	7.22	7.01
Nitrogen Free Extract	72.77	55.19	55.43	53.65	56.23
Gross energy (kcal/kg)	5562	-	-	-	-

Table 3 Performance characteristics of experimental birds

Parameter (g/bird)	Treatments				SEM
	A	B	C	D	
Initial live weight	65.99	65.98	66.01	66.02	0.02
Final body weights	1259.00	1091.00	1048.00	961.00	1.46
Total weight gain	1193.01 ^a	1025.02 ^b	981.99 ^b	894.98 ^c	43.09
Feed intake	6483.80 ^c	6742.20 ^b	6886.70 ^{ab}	7046.90 ^a	6.81
Feed conversion ratio	5.11 ^c	6.18 ^b	6.57 ^{ab}	7.33 ^a	1.81
Mortality	-	-	-	-	-

^{a,b,c,d} Means values in a row with different superscripts are significantly different (P<0.05).

SEM : Standard Error of Means.

growth rate (P<0.05) was recorded for 30% KHM birds. This implies that control diet was efficiently utilized for growth than KHM diets. It also indicated that KHM could be efficiently utilized by cockerels up to 20% dietary level above which the depression in growth rate occurs. The low growth rate of 30% KHM birds might be due to reduced protein intake as a result of dilution effect by KHM fibre constituents. Also presence of kolatin and tannin could have probably accounted for this depressive effect of KHM on growth rate of cockerels (Opeke, 1992; Babatunde *et al.*, 2001). The control birds utilized their feeds efficiently (P>0.05) than the other treatments. The experimental birds were able to convert 10 and

20% KHM diets efficiently (P<0.05) than 30% KHM diet.

The results of nutrient retention of cockerels fed KHM diets are shown in table 4. The results observed in this study agreed with the reports of Oluokun and Olalokun, (1999) that KHM depressed nutrient utilization in monogastric animal by impairing digestion and absorption of nutrients. The results did not follow a specific pattern or trend as each nutrient was affected differently (P<0.05). There were significant differences (P<0.05) between apparent dry matter digestibility (ADMD) of treatment means. The mean values were very low with the highest

Table 4 Nutrient retention of experimental birds on KHM-based diets

Parameter (g/bird)	Treatments				SEM
	A	B	C	D	
Dry matter digestibility	35.31 ^a	7.72 ^d	16.85 ^c	22.04 ^b	3.77
Nitrogen retention	45.74 ^a	24.58 ^b	13.79 ^c	9.09 ^d	5.34
Ether extract digestibility	73.85 ^a	61.28 ^c	63.47 ^b	47.78 ^d	3.51
Crude fibre digestibility	69.48 ^a	57.56 ^b	48.04 ^c	40.83 ^d	4.06

^{a,b,c,d} Means values in a row with different superscripts are significantly different (P<0.05).

SEM : Standard Error of means.

ADMD recorded ($P<0.05$) in control treatment, followed by 30 and 20% KHM birds, while 10% KHM birds had significantly lower ($P<0.05$) ADMD.

There was linear reduction ($P<0.05$) in nitrogen retention of cockerels birds at each incremental KHM dietary levels. Control birds had significant higher ($P<0.05$) nitrogen retention (45.74%), while 30% KHM birds had the lowest (9.09%). The nitrogen retention values observed in this study were lower than the values reported by Ogbonna and Adebawale (1993). This could be due to the quality of experimental diets, composition of food and level of feeding test ingredient-cassava peel meal (CPM) by these authors, as the cockerels were fed with higher crude protein and metabolizable energy (ME). The strain of birds and quality of feed used in this study could have probably accounted for this low nitrogen retention of cockerels than the broilers (Hamzat and Babatunde, 2001).

There was direct reduction ($P<0.05$) in apparent crude fibre digestibility (ACFD) of cockerel birds as dietary inclusion of KHM increases along the treatments. The control birds were able to digest their feed better ($P<0.05$) than KHM birds. The lowest ACFD was recorded for treatment D on 30%KHM feeds.

Apparent crude fat digestibility values were obviously higher than other nutrients retention values. High significant crude fat digestibility ($P<0.05$) were recorded for control birds than other treatments, followed by 20 and 10%KHM birds, while the lowest value was recorded for 30%KHM birds.

Conclusion

The results of this study show kola nut meal as a potential feedstuff in monogastric nutrition. KHM could be efficiently utilized by cockerels up to 20% dietary level above which the depression in nutrient utilization and ultimate performance of the birds occurs.

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