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Evaluation of Palm Kernel Meal as Substitute for Soyabean Meal in the Diet of Growing Cockerels

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Abstract: One hundred and twenty Anak Cockerels were used in a 56-day trial to determine the substitutional value of Palm Kernel meal (PKM) for Soyabean meal in the diet of growing cockerels. The five week-old cockerels were randomly allotted to five dietary treatment groups in which the dietary soyabean meal had been substituted with PKM at 0, 25, 50, 75 and 100%. The diets were respectively designated as diets 1, 2, 3, 4 and 5. The results showed that mean daily body weight gain and feed-to-gain ratio for all the treatments were significantly ($P<0.05$) influenced. Birds fed diet 2 had the highest weight gain (1229.17g) followed by birds fed diet 1 (control) while birds fed diets 3, 4 and 5 respectively had their weights depressed. Birds fed diet 2 gave the best feed-to-gain ratio (3.88). The feed cost per kilogramme diet significantly ($P<0.05$) decreased with the increasing PKM replacement of soyabean meal. Diet 2 gave the least cost per kg weight gain (N159.90) and the highest accruable revenue (N614.58). From the results of this study, it would appear that substituting 25% of soyabean meal with PKM in growing cockerel diets would not only be economically advantageous but enhanced performance.

Key words: Palm kernel meal, diet of cockerels, soyabean meal, growing cockerels

Introduction

The limited supply of good quality raw materials such as soyabean meal, groundnut cake and cotton seed cake for the poultry feed industry has resulted in a continuous increase in the cost of production, causing a phenomenal rise in the unit cost of products. Thus, these products have become too expensive for the majority of the population in Nigeria and elsewhere (Tewe, 2003; Esonu *et al*., 2003). This, according to Tewe (2003 has further lowered productivity of stock as the quantities of cereals and protein concentrates in the mix are hardly sufficient to meet minimum nutrient requirements. The prohibitive costs do not allow the use of margins of safety to take care of specific peculiarities which include differences in the nutrient composition of the feedstuffs, unfavourable storage conditions which may reduce effective concentration of dietary nutrients below calculated values, improper processing methods, inadequate feed mixing and some special extra need of the particular class of livestock species.

Palm kernel meal (PKM) which is a by-product of palm oil extraction is an alternative feedstuff that holds some promise if the cultivation of the crop from which it is derived is substantially increased Tewe (2003). Palm Kernel meal is abundant in many tropical regions and is a cheap feeding stuff imported by many countries. According to Onwudike (1986) its use in poultry feeding has not been very much encouraged. Oyenuga (1968) and Babatunde *et al*. (1975) had earlier reported PKM to be unacceptable to pigs and cast doubt on its acceptability by other non-ruminant animals. These views were based on the high fibre level of PKM and its gritty nature, which were reported to reduce digestibility, palatability and possibly the availability of nutrients, especially amino acids (Onwudike, 1986; Olomu, 1995). Inspite of the factors that inhibit the effective utilization of PKM, supplementation of dietary PKM with symthetic amino acid had been found to enhance its utilization especially in poultry. For instance, Ojewola *et al*. (2003) observed improved weight gain, feed efficiency and decrease cost per kg weight gain when dietary PKM supplemented with 0.2% of both methionine and lysine was fed to turkey poults in a tropical environment.

This study was therefore conducted to investigate the biologic and economic efficiencies of substituting soyabean meal with PKM in growing cockerel rations.

Materials and Methods

A total of one hundred and twenty day-old Anak Cockerels were purchased from a commercial hatchery. They were fed commercial starter chick diet (21% CP and 2750Kacl/kg ME) *ad-libitum* during the first five weeks of life. At the beginning of the trial (5^{th} week), the birds were weighed and randomly assigned to the five dietary treatments which were replicated three times by the completely randomized design; thus each of the 15 pens had 8 growing cockerels. Dietary treatment 1 (control) contained 20% soyabean meal and no PKM, while diets 2, 3, 4 and 5 had their soyabean meal substituted at 25, 50, 75 and 100% respectively.

Management procedures including vaccination were uniform for all the birds. At the end of each week, the

Table 1: Percentage composition of experimental diet fed growing cockerels from the 5th to 13th week of age

	Diets				
Ingredient	1	2	3	4	5
Yellow maize	36.65	36.65	36.65	36.65	36.65
Maize offal	35.65	35.65	35.65	35.65	35.65
Soyabean Meal	20.00	15.00	10.00	5.00	00.00
Palm Kernel Meal	00.00	5.00	10.00	15.00	20.00
Fish meal (Danish)	2.00	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Oyster Shell	2.00	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25
DL-Methionene	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00	100.00
Calculated nutrient content					
Crude protein(%)	17.30	16.23	15.03	13.83	12.62
Metabolizable energy (Kcal /kg).	2741.01	2720.76	2694.51	2668.26	2642.01

Vitamin-Mineral Premix (VITADIZ GBF) - To provide the following per 2.5kg of feed – Vitamin A, 8.000.000 I.U; Vitamin D_3, 1,6000.000 I.U; Vitamin E 5,000 I.U; Vitamin K 2,000 mgr; Thiamine B 1,500mgr; Riboflavine B_2 4,000mgr; Pyridoxine B_6 I,5000mgr; Niacin, 15, Vitamin B_{12}, 10mgr; Pantothenic acid, 5000mgr; Folic acid 500mgr, Biotin 20gr; choline chloride 200gr; Antioxidant 125gr; Manganess 80gr; Zine 50gr; Iron 20gr; Copper 5gr; Iodine 1.2gr; and Selenium 200gr.

Table 2: Effect of substituting Soyabean meal with palm kernel meal on the performance of growing anak cockerels (5 – 13 wks)

	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5	SEM
Mean Initial body weigh(g)	429.17	445.83	433.33	437.50	428.33	10.94
Mean final body weight (g)	157.00^{ab}	1675.00^{a}	1525.00^{b}	1425.00^{c}	1275.00^{d}	75.83
Mean total body weight gain(g)	1145.83^{a}	1229.17^{a}	1091.67^{a}	987.50^{ac}	866.67^{c}	77.83
Mean daily body weight gain(g)	20.47^{ab}	21.93^{a}	19.50^{ab}	18.00^{c}	15.47^{c}	1.45
Mean daily feed intake(g)	81.80^{c}	84.80^{b}	81.90^{c}	85.50^{a}	66.33^{d}	0.0043
Mean total feed intake(g)	4581.00^{d}	4750.00^{b}	4588.00^{c}	4790.00^{a}	37.15^{c}	0.77
Feed-to-gain ratio	4.01^{b}	3.88^{b}	4.22^{b}	4.86^{a}	4.29^{b}	0.30

abcde - Means in a row with different superscripts are significantly different (P<0.05)

Table 3: Economics of substituting soyabean meal with palm kernel meal in the diet of growing cockerel (5- 13 wks)

	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5	SEM
Cost per kg feed (N)	44.09^{a}	41.24^{b}	3839^{c}	35.54^{d}	32.69^{c}	0.00
Cost per kg weight gain (N)	176.45^{ab}	159.90^{b}	166.96^{b}	174.10^{b}	195.65^{a}	10.51
Cost of production (N)	201.60	195.97	122.55	169.31	195.65	40.77
Revenue (N)	572.92^{a}	614.58^{a}	545.83^{ab}	493.67^{bc}	433.33^{c}	38.91
Gross margin (N)	371.31^{ab}	418.61^{a}	370.28^{ab}	324.36^{b}	311.85^{b}	38.86

abcde - Means in a row with different superscripts are significantly different (P<0.05). * $ = N120.00

birds were weighed individually to determine bodyweight gain. Feed consumption was calculated by difference between the quantity offered and the quantity left. Feed-to-gain ratio was calculated using the birds weight gain and the amount of feed consumed. The prevailing market prices of the various feed ingredients and feed consumption of the birds used were taken into account in determining the economics of substituting soyabean meal with palm kernel meal in growing cockerel rations. Data collected were subjected to analysis of variance using the model for completely randomized design (Steel and Torrie, 1960). Significant means were tested using Duncan's Multiple range test (Duncan, 1955).

Results and Discussion

The effects of substituting soyabean meal with PKM on performance of growing Anak cockerels are presented in Table 2. Mean daily body weight gain for the treatments were significantly different (P<0.05). Birds fed diet 2 had the highest weight gain (1229.17g) followed by birds fed diet 1 (control) while birds fed diets 3, 4 and 5 respectively had their weights depressed. This could be due to the high fibre level of PKM and its gritty nature, which were reported to reduce digestibility and possibly the availability of nutrients especially amino acids (Onwudike, 1986; Yeong, 1983). The fibre in PKM, according to Babatunde *et al*. (1975) may be structural in nature and may therefore reduce digestive enzyme action on PKM protein and availability of the protein. There were significant differences (P<0.05) among treatment means for both feed intake and feed-to-gain ratio. Birds placed on diet 4 gave the highest (P<0.05) mean daily feed intake while feed-to-gain ratio as measured by feed intake per unit of weight gained was poorest on treatment 4. Birds fed diet 5 significantly (P<0.05) had their feed intake depressed. It may be that

beyond 75% soyabean meal substitution with PKM, the diet became upalatable (Temperton and Dudley, 1940) while the dietary protein and energy were drastically reduced. Birds fed diet 2 gave the best feed-to-gain ratio (3.88). This seems to suggest that replacing 25% of soyabean meal with PKM can provide a better amino acid balance for growing cockerels.

The result showed the feed cost per kilogramme diet (Table 3) to significantly ($P<0.05$) decrease with the increasing PKM replacement of soyabean meal. This could be attributed to the replacement of the more expensive soyabean meal with the relatively cheaper PKM. Diet 2 gave the least cost per kg-weight gain (N159.90), followed by diets 3 (N166.96), (N174.10), 4 (N176.45) and 5 (N195.65) respectively. The revenue realized was highest for diet 2 (N614.58) while Diet 5 gave the least value (N433.33). Diet 2 also gave the highest gross margin (N418.61) while diet 5 gave the least value (N311.85). The result of this study showed that when up to 25% PKM was used to substitute soyabean meal in diets for cockerels, the performance and economic parameters considered were better than all the other diets including the control diet (Diet 1) which contained 20% soyabean meal. With this level of inclusion, costly soyabean meal can be reduced thus reducing cost of production.

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