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Effect of palm kernel cake and deoiled palm kernel cake on the performance of cockerels

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Abstract

Forty (40), thirteen weeks old cockerels were allocated to five dietary treatments after balancing for weight. The eight birds on each dietary treatment were replicated four times, such that two birds served as a replicate. In Diet 1 (Control) contain 0% Palm Kernel Cake (PKC) and Deoiled Palm Kernel Cake (DOC). Diet 2 and 3 continued 40% PKC, Diet 2 was presented in mash form while Diet 3 was presented as pellet. Diets 4 and 5 contained 40% DOC, Diet 4 was presented as mash while Diet 5 was presented as pellet. Dietary treatments had no effect (P > 0.05) on daily weight gain (ADG) and feed conversion ratio (FCR). Significant dietary effects (P > 0.05) were however noted for daily feed intake (FI) and weight of spleen. In economic terms Diet 1 was the most expensive (₦30.03/kg) while Diet 4 was the cheapest (₦15.85/kg). Birds on Dietary Treatment 1 elicited the highest cost/kg of weight (₦314.13/kg weight gain) while it cost ₦160.50 to gain 1kg. of weight by birds on Diet 4. The results obtained in this study indicated that both PKC and DOC could be used to some appreciable extent in the feed of cockerels. The use of PKC and DOC considerably reduced feed costs of cockerel.

Keywords: Palm Kernel Cake, Deoiled Cake of Palm Kernel, Cockerels

Introduction

The conventional protein feedstuffs (based chiefly on soybean and groundnut), continue to be scarce and expensive in Nigeria as they suffer from severe competition with humans as food and for industrial usage. To this end, there is need to explore cheap and readily available protein sources such as Palm Kernel Cake (PKC) and Deoiled Palm Kernel Cake (DOC).

The fruit of oil palm (*Elaeis guineansis*) grows in bunches and consists essentially of a soft outer skin, which is reddish orange when ripe, and a fibrous layer covering the nut, composed of a shell and a kernel. The main product from the outer skin is Palm Oil while that from the nut in the kernel is Palm Kernel Oil. The major by-product of palm kernel oil production is Palm Kernel Cake (PKC). Further extraction of oil from PKC result in the production of Deoiled Palm Kernel Cake (DOC).

PKC as individual ingredients have been extensively studied for various monogastric

species as a major feed ingredient in the diet of poultry, pigs and rabbits (Onifade and Babatunde 1998; Perez *et al* 2000. Jegede *et al* (1993) reported that high palm kernel meal diet has improved the texture, reduced dustiness of feed and also the performance of birds consuming such diets. Research in the past has shown that growing chickens can use palm kernel cake if the diets are properly balanced (Yeong *et al.* 1981). Oyenuga (1981) reported that palm kernel cake has a high proportion of arginine and glutamic acid. The inclusion of palm kernel meal in the diet improves the immune system of birds and reduces pathogenic bacteria and increases the population of non-pathogenic bacteria in the intestine (Sundu *et al 2005)*. These two benefits should be considered as strong recommendations for using palm kernel cake in poultry diets. All the factors stated above favours the justification of utilizing palm kernel cake and deoiled cake of palm kernel in poultry feeding. The objective of this study was to evaluate the effect of palm kernel cake and deoiled cake of palm kernel on growth performance and carcass characteristics of cockerel birds.

Materials and Methods

The study was carried out at the Poultry Unit of the Teaching and Research Farm, College of Agricultural Sciences, Olabisi Onabanjo University, Ago Iwoye. Five experimental diets were formulated; with diet one as the control. Diets two and three contained 40% PKC and were presented as mash and pellet respectively. Diets four and five were the corresponding diets containing deoiled cake of palm kernel at 40% inclusion level, presented in mash and pellet form respectively (Table 1).

Forty birds of thirteen weeks old were purchased from Olabisi Onabanjo University Poultry Unit of the Teaching and Research Farm. Birds were selected after weighing individually to obtain mean weight, and they were later divided into five groups of similar initial mean body weights with two birds making up a replicate. Each treatment had eight birds with four replicate. All recommended vaccination had been given before the start of the study. Birds were fed *ad-libitum* and allowed unrestricted access to water throughout the eight weeks experimental period. The data collected included daily feed intake, weekly body weight gain, feed conversion ratio and feed economy. These data were collected for eight weeks. Also at the end of the experiment, the birds for each treatment were randomly selected and slaughtered for carcass gut dimension analysis.

Proximate composition of experimental diets was determined by the method of A.O.A.C (1990). All data collected were subjected to analysis of variance (ANOVA) using the procedure stated by Steel and Torrie (1980).

Results and Discussion

There was no significant effect of treatment on daily weight gain and feed conversion ratio this was in agreement with the findings of Osei and Amo (1987). Significant treatment differences were observed for daily feed intake ($p<0.05$). Oyenuga (1981) reported that palm kernel cake has a high proportion of arginine and glutamic acid, which tend to promote the intake

Table 1. Composition of experimental diets (gkg^{-1})

Ingredients	Control Diet	Diet 2 PKC MASH	Diet 3 PKC PELLET	Diet 4 DOC MASH	Diet 5 DOC PELLET
Maize	274.00	-	-	-	-
FFSBB	256.0	130.0	130.0	130.0	130.0
Wheat Ban	127.60	127.60	127.60	127.60	127.60
Biscuit dust	305.00	305.00	305.00	305.00	305.00
PKC	-	400.00	400.00	-	-
DOC	-	-	-	400.00	400.00
Oyster shell	20.00	20.00	20.00	20.00	20.00
Bone meal	10.00	10.00	10.00	10.00	10.00
Salt	5.00	5.00	5.00	5.00	5.00
Vit/Min mix	2.50	2.50	2.50	2.50	2.50
TOTAL	1000.00	1000.00	1000.00	1000.00	1000.00
Determined Analysis (%)					
Crude Protein	18.00	18.24	18.20	18.74	18.65
Crude Fibre	3.93	7.86	7.86	8.06	8.02
Crude Fat	4.60	3.59	3.59	3.10	3.10
ENERGY (MEKcal/kg	3,093.06	2,490.88	2,488.03	2,458.86	2,451.10)

of the feed due to characteristic smell given to the diets by glutamic acid present in PKC and DOC.

Numerically, the highest daily weight gain was recorded for treatment 5, followed by treatments 4 and 2, which had same value for daily weight gain as shown in table 2. Treatment 1, which was the control diet, had the lowest efficiency in terms of daily weight gain. Birds fed on pelleted diets, were less efficient in terms of feed conversion ratio and they ate more feed easily than birds with mash diet, except for treatment 1.The feed conversion ratio was in the order of T3<T1<T5<T2<T4.

Table 3 shows the cost effectiveness of different dietary treatments. The cost/kg for Treatments 3 and 5 were the highest due to the cost of pelleting that was added. Diet 1, the control diet, was very expensive because of the presence of maize in it. However, treatment 1 had the highest cost/kg weight gain; it also had the highest cost/kg feed. Diet 4 had the least cost/kg weight gain (₦138.64) and the least cost for a unit weight of feed. (₦15.845/kg). It could be

Table 2 Effects of Dietary Treatments on Daily Weight Gain, Feed Intake, and Feed Conversion Ratio of Cockerels

Measurements	Control Diet	Diet 2 PKC MASH	Diet 3 PKC PELLET	Diet 4 DOC MASH	Diet 5 DOC PELLET	SEM
Daily weight gain (g/bird/day)	14.06	14.45	12.39	14.45	14.52	0.822
Daily feed intake (g/bird/day)	147.10[a]	146.78[a]	146.50[a]	146.40[a]	148.10[ab]	0.442[*]
Feed conversion ratio	10.46	10.15	11.82	10.13	10.21	0.880

Table 3. Feed Economy of Cockerels on PKC and DOC based diets

Treatment	Cost/kg Feed	Cost/kg weight gain
1	30.032	271.49
2	16.845	147.73
3	17.345	187.30
4	15.845	138.64
5	17.345	152.98

Table 4. Dietary Treatment Effect on Gut Weights and Dimension

Measurement	Control	PKC (Mash	PKC (Pellet)	DOC (Mash)	DOC (Pellet)	SEM*
Weigh of full G.I.T.	7.89	9.60	9.85	9.47	8.72	1.05 N S
Weight of empty G.I.T	5.57	5.95	7.27	6.06	5.53	2.30 NS
Weight of full Caeca	0.71	0.53	0.79	0.13	1.03	0.14 N S
Weight of empty Caeca	0.35	0.39	0.43	0.39	0.35	0.13 N S
Weight of full gizzard	3.41	4.39	4.06	3.65	4.36	0.59 N S
Weights of empty gizzard	2.65	2.82	2.88	2.70	2.97	0.20 NS

*SEM: Standard Error of Means.

Table 5. Dietary Treatment Effects on Carcass Characteristics and Organ Weights of Cockerels

Measurement	Control Diet 1	PKC Mash 2	PKC Pellet 3	DOC Mash 4	DOC Pellet 5	S EM*
Dressing %	58.27	56.96	54.05	55.24	54.55	2.86NS
Weight of thigh	15.66	17.97	16.64	17.59	16.83	3.42 N S
Weight of breast	24.09	22.79	4.04	22.34	22.74	8.65 N S
Weight of drumstick	17.88	18.43	20.34	18.85	19.43	1.31 N S
Weigh of liver	1.58	2.34	2.31	1.61	1.79	0.44 N S
Weight of spleen	0.23	0.24	0.21	0.35	0.27	0.03 S
Weight of heart	0.82	0.78	1.27	0.69	0.88	0.43 N S
Weight of proventiculus	0.71	0.71	0.79	0.74	0.85	0.16 N S

*SEM: Standard Error of Means.

considered the best compared with the other diets because, it was the cheapest and had the best result in terms of efficiency of conversion of feed to gain.

Table 4 indicates that dietary treatment had no significant influence on all the gut measurements.

The values for all organs and carcass weight, except for the spleen showed no significant differences (Table 5).

Conclusion

There were significant treatment ($P<0.05$) effects on daily feed intake and very significant ($P<0.01$) effect of treatment on weight of spleen. However, daily weight gain, feed conversion ratio and all the carcass characteristics were not significantly affected.

Diet 4 had the least cost of production, the least cost/kg weight gain and least cost/kg feed. This study reveals that both palm kernel cake and deoiled cake of palm kernel can be used up to 40% of total diet in feeding cockerels. There was little improvement of poultry on the utilization of the test materials by experimental birds. Judging from the relative lower unit price of deoiled cake over palm kernel cake, it is suggested that deoiled cake can be used to replace palm kernel cake inclusion up to 40% of the diet without adverse effects on performance and carcass characteristics of birds.

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