PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Pakistan Journal of Nutrition 3 (4): 254-257, 2004

Comparative Performance of Broiler Chickens Fed Varying Levels of Palm Kernel Cake and Maize Offal

E.V. Ezieshi and J.M. Olomu
Department of Animal Science, University of Benin, Benin City, Nigeria
E-mail: bankymao@uniben.edu

Abstract: Studies were conducted to compare the effects of dietary PKC and maize offal on the performance of broilers. According to the results of the trial with broiler starter chicks, the birds on the control diet (without PKC or maize offal) gave the highest body weight gain (1236.37g/bird). The result further showed that the birds on maize offal diets performed slightly better (1092.17 and 1005.56g/bird) than those on PKC diets (984.12 and 877.61g/bird). The birds on PKC diets consumed more feed (2446.11 and 2416.69g/bird) than those on maize offal diets (2329.05 and 2106.94g/bird). Feed cost per kg live weight gain was generally higher with PKC diets than with maize offal diets. Average daily water intake was not significantly affected by diets (200 to 300 ml/bird/day). Dry matter retention was higher with maize offal diets (66.45 and 68.52%) than with PKC diets (59.92 and 55.24%). The birds on the control diet gave almost similar crude protein and fat retention with those on maize offal diets (about 74%). The results of the trial with broiler finisher chickens indicated that weight gain per bird slightly decreased when PKC or maize offal replaced maize in the diet. Feed intake increased slightly when 50% of dietary maize was replaced with PKC or maize offal. Feed to gain ratio increased significantly with the inclusion of PKC or maize offal in the diet. Water intake was not significantly affected by diets (400 to 500ml/bird/day). Dietary PKC significantly decreased dry matter retention. Crude protein retention was significantly higher in the maize offal diets (72.41 and 76.99%) as compared to PKC diets (59.91 and 64.25%). Fat retention significantly decreased with the test diets. From the foregoing, therefore, it can be concluded that both ingredients performed significantly well when compared to the control diet. However, maize offal seemed to have performed better than PKC in a number of parameters.

Key words: Palm-kernel cake, maize offal, broiler chickens, soyabean meal

Introduction

Different dietary levels of palm kernel cake (PKC) have been successfully fed to broilers with or without supplementary lysine, methione or fish meal (Armas and Chicco, 1977; Yeong *et al.*, 1981; Onwudike, 1986; Okon and Ogunmodede, 1996). Similarly, maize offal has been employed in the formulation of feed for poultry (Chestnut *et al.,* 1983; Uko *et al.,* 1990; 1991). However, the optimum inclusion levels of PKC and maize offal for broilers have not been fully worked out. Secondly, there is no published information on the use of PKC or maize offal in place of SBM for broiler. PKC and maize offal are known to have almost similar crude protein levels and are used indiscriminately as feed supplements by local farmers. It may be necessary therefore, to compare both feedstuffs vis-a vis their effect on the performance of broiler chickens.

Materials and Methods

Palm kernel cake was obtained as a by-product of palm kernel oil extraction while maize offal is a by product of the wet milling of fermented maize to produce “akamu” or “agidi”.

One hundred and eighty Hubbard broiler chicks were used for this study. The birds were brooded and reared on deep litter in a standard tropical poultry building divided into experimental units. At the beginning of the experiments the chicks were weighted and randomly divided into 15 similar groups. Three such groups were randomly assigned to 5 diets. Each group constituted a replicate. Feed and water were supplied *ad lititum.*

Diets: The experiment was conducted in two stages, the starter and finisher stages. At each of the stages, Diet 1 (without PKC or maize offal) served as control and were formulated to meet the requirements of broiler starter chicks and finisher chickens respectively according to the recommendation of Olomu (1995). The replacement regimen was the same for the starter and finisher stages. In Diet 2.50% of he maize was replaced with PKC while in Diet 3, PKC simultaneously replaced 50% of the maize and 40% of the soyabean meal contained in Diet 1. In Diets 4 and 5, maize offal was used in place of maize and soyabean meal respectively as in Diets 2 and 3. The percentage composition of the experimental Diets are shown in Table 1 and 2.

Data Collection: Chicks were observed daily and a record of mortality was kept. The birds were weighed

Table 1: Percentage Composition of Starter Diets

Ingredients	Diets				
	1	2	3	4	5
Maize	60	30	30	30	30
Soyabean meal	35.40	35.40	21.55	35.40	21.55
PKC	0.00	30.00	43.85	0.00	0.00
Maize offal	0.00	0.00	0.00	30.00	43.85
Bone meal	2.55	2.55	2.55	2.55	2.55
Oyster Shell	1.00	1.00	1.00	1.00	1.00
Salt	0.35	0.35	0.35	0.35	0.35
Premix*	0.50	0.50	0.50	0.50	0.50
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Cost/kg diet (N)	40.18	31.33	26.13	31.75	26.79

*Supplied per kg diet Vit A, 10,000 I.U; Vit D_3 2000 I.U; Vit E 40mg; Vit K_3, 2mg; Vit B_1 2.4mg; Vit B_2 4.8mg; Vit B_6 4.8, Niacin, 32mg; Pantothenic acid, 8mg; Biotin 0.1mg, Vit B_{12}, 0.02mg; Folic Acid, 0.8mg; Cholin Chloride, 40mg; Manganese, 80mg; Iron, 40mg; Zinc, 36mg; Copper, 1.6mg; Iodine, 1.24mg; Cobalt, 0.2mg; Selenium, 0.08mg.

Table 2: Percentage Composition of Finisher Diets

Ingredients	Diets				
	1	2	3	4	5
Maize	68.00	34.00	34.00	34.00	34.00
Soyabean meal	28.00	28.00	17.05	28.00	17.05
PKC	0.00	34.00	44.95	0.00	0.00
Maize offal	0.00	0.00	0.00	34.00	44.95
Bone meal	2.00	2.00	2.00	2.00	2.00
Oyster Shell	1.00	1.00	1.00	1.00	1.00
Salt	0.35	0.35	0.35	0.35	0.35
Premix*	0.45	0.45	0.45	0.45	0.45
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Cost/kg diet (N)	39.43	29.57	25.52	29.91	25.97

*Supplied per kg diet: Vit A, 900 I.U; Vit D_3, 1440 I.U, Vit E, 21.6mg; Vit K, 2.7mg; Vit B_1, 1.8mg; Vit B_2, 3.6mg; Vit B_6, 2.7mg; Niacin, 21.6mg; Pantothenic acid, 9.0mg; Biotin, 0.036mg; Vit B_{12}, 0.018mg; Folic acid, 0.54mg; Cholin chloride, 270mg; Manganese, 108mg; Iron, 18mg; Zinc, 27mg; Copper, 1.44mg; Iodine, 0.72mg; Cobalt, 0.1mg; Selenium, 0.1mg; Growth promoter, 14.4mg; Anti- Oxidant, 720.

Table 3: Proximate Components of Experimental Diets and Test Ingredients

	CP		CF		EE		ASH	
Diet	Starter	Finisher	Starter	Finisher	Starter	Finisher	Starter	Finisher
1	22.13	16.83	4.10	3.44	1.89	2.86	4.06	7.54
2	24.57	21.20	5.00	4.40	3.01	2.58	7.28	5.36
3	21.79	19.12	7.28	6.22	2.41	2.33	4.84	6.08
4	23.39	20.02	5.46	14.16	2.01	3.12	9.52	6.94
5	21.67	17.69	6.96	7.82	2.60	2.46	7.17	8.12
PKC	14.04		17.05		3.63		3.38	
Maize offal	13.39		9.00		2.73		1.54	

and feed intake was recorded weekly. Daily water intake was determined through out the period. At 5 weeks of age, 4 birds (2 males and 2 females) were randomly selected from each replicate and transferred to metabolism cages to determine nutrient utilization for the starting period. After 3 days adaptation period, total excreta voided per group was collected on a daily basis for 3 days, weighted and oven-dried to a constant weight to determine moisture content. Feed intake per group was further determined during the period. The exercise

Table 4: Performance and apparent nutrient utilization of broiler starter chicks (1-5 weeks of age) fed varying levels of PKC and maize offal

Performance parameter	Diets					
	1	2	3	4	5	SEM
Final body weight (g/bird)	1372.33[a]	1118.18[c]	1008.33[d]	1230.00[b]	1138.67[c]	25.27
Weight gain (g/bird)	1236.37[a]	984.12[c]	877.61[d]	1092.17[b]	1005.56[c]	29.10
Feed intake (g/bird)	2347.55[b]	2446.11[a]	2416.69[a]	2329.05[b]	2106.94[c]	25.35
Feed to gain ratio	1.9[d]	2.5[b]	2.8[a]	2.1[c]	0.057	
Feed cost per kg gain (N)	76.48[a]	78.22[a]	71.94[b]	67.69[c]	56.26[d]	1.74
Average daily water intake (ml/bird/day)	251.33	271.16	231.15	259.79	218.55	21.01
Dry matter retention (%)	74.01	59.92[c]	55.24[d]	66.45[b]	68.52[b]	1.14
Crude protein retention (%)	58.44[a]	44.55[b]	38.51[b]	58.02[a]	62.65[a]	2.69
Fat retention (%)	69.69[a]	50.62[c]	58.90[bc]	77.29[a]	75.15[a]	5.11

Table 5: Performance and apparent nutrient utilization of broiler finisher chickens (6-9 weeks of age) fed varying levels of PKC and maize offal

Performance parameter	Diets					
	1	2	3	4	5	SEM
Final body weight (g/bird)	2373.81[a]	2270.00[ab]	2064.24[b]	2202.83[ab]	2251.00[ab]	31.65
Weight gain (g/bird)	1008.05[a]	902.12[ab]	779.70[b]	899.29[ab]	906.45[ab]	65.00
Feed intake (g/bird)	2939.3[ab]	3092.7[a]	2798.8[b]	3028.2[ab]	2893.9[ab]	116.45
Feed to gain ratio	2.9[b]	3.4[a]	3.6[a]	3.4[a]	3.2a[b]	0.16
Feed cost per kg gain (N)	115.40[a]	101.32[b]	91.79[bc]	101.09[b]	83.94[c]	4.888
Average daily water intake (ml/bird/day)	446.02[a]	519.03[a]	487.63[a]	472.78[a]	511.78[a]	34.484
Dry matter retention (%)	72.85[a]	58.91[b]	6017[b]	71.35[a]	70.31[a]	2.487
Crude protein retention (%)	60.28[c]	59.91[c]	64.25[bc]	72.41[ab]	76.99[a]	5.044
Fat retention (%)	80.44[a]	72.54[b]	65.01[c]	78.78[ab]	73.04[ab]	3.182

was repeated at 9 weeks of age for the finishing period. The dried faecal samples per group for the 3-day period were bulked. Representative samples of feed and excreta were analyzed for proximate composition using A.O.A.C. (1990) methods.

Statistical Analysis: Data obtained were subjected to analysis of variance (ANOVA) in a randomized complete block design (RCBD) using the method described by Steel and Torrie (1980). Where significant differences were observed among means, the Duncan's Multiple Range test was used to determine the significant differences among the means.

Results and Discussion

According to the results of the trial with broiler starter chicks, the birds on the control diet gave the highest body weight gain. The result further showed that the birds on maize offal diets performed better than those of PKC diets. The birds on PKC diets consumed more feed than those on maize offal diets. Feed cost per kg live weight gain was generally higher in PKC diets than with maize offal diets. Average daily water intake and feed to gain ratio were not significantly affected by diets. Dry matter retention was higher with maize offal diets than with PKC diets. The birds on the control diet gave almost similar crude protein and fat retention with those on maize offal diets. The results of the trial with broiler finisher chickens indicated that weight gain per bird slightly decreased when PKC or maize offal replaced maize in the diet. Feed intake increased slightly when 50% of dietary maize was replaced with PKC or maize offal. Feed to gain ratio increased significantly with the inclusion of PKC or maize offal. Water intake was not significantly affected by diets. Dietary PKC significantly decreased dry matter retention. Crude protein retention was significantly higher with the maize offal diets as compared to PKC diets. Fat retention was significantly lower on the PKC diets.

The performance of the birds was better on the maize offal diets than on the PKC diets probably because higher amounts of crude protein and fats were retained on the maize offal diets than on the PKC diets. The reasons for the differences in nutrient retention between the PKC and maize offal diets are not quite clear, but may be related to the differences in the crude fibre contents of the diets. The higher crude fibre content of the PKC diets may have adversely affected digestion. PKC in diets has been implicated in low digestibility of feed (McDonald *et al.*,1983) due it's high crude fibre level which is estimated at 150g/kg of PKC. The lower nutrient retention observed with the PKC diets as compared with

the maize offal diets can therefore, be attributed to the difference in crude fibre levels of the ingredients.
This assertion is corroborated by the results of Yaakugh *et al*. (1994) which indicated that the digestibility of a diet is inversely related to its fibre content.

Conclusion: It can be safely concluded that the two test ingredients can be used as alternative ingredients to maize and sometimes to soyabean meal to further reduce feed cost in broiler production. It has also been found that maize offal can perform better than PKC in Broiler diets.

References

Association of Official analytical chemists (A.O.A.C), 1990. Official methods of analysis, 14th edition, Washington DC.

Armas, A.B. and C.F. Chicco, 1977. Use of the palm kernel meal of the oil palm (Elaeis guineensis, Jacq) in broiler chicken diets. Agro. Trop., 27: 339-343.

Chestnut, A.B., E.A.O. Laseinde and D.B. Olumeyan, 1983. The effect on performance and economic feasibility of substituting maize homony for maize in tropical broiler diet. Prod. Anim. Trop., 8: 279-287.

McDonald, P. R.A. Edwards and J.F.D. Greenhalgh, 1983. Animal Nutrition, Longman group Limited. 3rd edition, pp: 393-409.

Olomu, J.M., 1995. Nutrient requirement of poultry. In: Animal Nutrition-principles and practices A. Jachem publication, Benin City, Nigeria, pp: 67-72.

Okon, B.I. and B.K. Ogunmodede, 1996. Carcass characteristic of broilers fed pennloinkle flesh and palm kernel cake. Nig. J. Anim Prod., 23: 16-20.

Onwudike, O.C., 1986. Palm kernel meal as feed for poultry 3. Replacement of groundnut cake by palm kernel cake in broiler diet. Anim. Feed Sci. Tech., 16: 195-202.

Uko, J.O., P. Awoyesuku and G.M. Babatunde, 1990. Substituting value of maize offal for maize in diet of laying hens. Nig. J. Anim. Prod. 17:56-59.

Uko, J.O., P. Awoyesuku and G.M. Babatunde, 1991. Effect of graded levels of maize offal on nutrient digestibility and miner availability in diets of laying hens. Nig. J. Anim. Prod., 18: 17-21.

Steel, R.G.D. and J.H. Torrie, 1980. Principles and procedures of statistics, A biometrical Approach 2nd Ed. London. McGraw-Hill International Book Company.

Yaakugh, I.D.I., T.S.B. Tegbe, S.A. Olorunju and A.O. Aduku, 1994. Replacement of brewers dried grains for maize performance of pigs J. Sci Food Agri., 66: 165-471.

Yeong, S.W., T.K. Mukherjee and R.I. Hutagalung, 1981. The nutritive value of palm kernel cake as feed stuff for poultry. Proceedings of a national workshop on oil palm by-product utilization, December 1981 at Kuala Lumpur Malaysia, pp: 100-107.