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Sunflower Cake as a Substitute for Groundnut Cake in Commercial Broiler Chicks Diets

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Abstract: The study was carried out to investigate the effects of replacing groundnut cake (GC) with decorticated sunflower cake (DSC) on broiler chicks performance. A total of 72 one-day-old unsexed broiler chicks (Ross 308) were used. The experiment lasted 6 weeks (0-42 day). Three experimental diets were supplied *ad-libitum*. The GC in broiler chicks starter (260g/Kg) and finisher (185g/Kg) diets was replaced with DSC at 50 and 100% on an isocaloric and isonitrogenous basis. Replacement of GC with DSC at 50 and 100% had no significant effect (P>0.05) on body weight gain, feed consumption and feed efficiency of broiler chicks during starter, finisher and the whole period. It was concluded that DSC can replace up to 100% of GC in broiler chicks starter and finisher diets.

Key words: Sunflower cake, groundnut cake, substitute, broilers

Introduction

Feed is the main cost of poultry production and often accounts for 60-70 % of total cost of commercial broilers production. The best strategy to reduce costs is the development of diet formulation using alternative, locally available ingredients, thereby decreasing feed costs. The use of sunflower meal in animal feeding has been limited due to the high fibre content caused by residual seed hulls. The meal quality in terms of digestibility for poultry and monogastrics as well as protein content, is very variable (Coombs and Hall, 1999). Silva (1990) reported that sunflower meal can be used in diets in complement with other lysine-rich feed sources, but the high level of fibre in sunflower meal contributes to a reduction in the energy digestibility of the diets. Cortamira *et al*. (2000) found that sunflower meal in substitution of soybean meal requires the addition of vegetable oil and lysine in the diet composition for pigs, because of the high level of fibre in sunflower meal. The nutritional quality of sunflower meal (metabolizable energy, fibre content and protein quality) is affected by the processing method of oil extraction (Mandarino, 1997). Mandal *et al*. (2003) reported that inclusion of undecorticated sunflower meal at 0, 5 and 10 % level replacing part of soybean meal in the broiler chicks diet had no significant (P>0.05) effect on body weight gain and feed intake during starter or finisher period. However, during overall growth period (0-7 weeks) the feed conversion ratio decreased significantly (P<0.05) on inclusion of 10 % sunflower meal. Zatari and Sell (1990) found that inclusion of 10 or 20% sunflower meal (32.6% protein and 18.4% crude fibre) had no effect on body weight gain of broiler chicks, but significantly (P<0.01) impaired feed efficiency. Rama Rao *et al*. (2006) noticed that replacement of soybean meal with sunflower meal in broiler chicks diet up to 67 % in starter and 100% in finisher diet did not affect weight gain. Total and 67% replacement of soybean meal with sunflower meal depressed feed efficiency at 21 and 42 day of age respectively. Feed intake was significantly higher in sunflower meal-based diet, than in the soybean meal reference diet at 21 and 42 day of age, except in group given sunflower meal 100% at 21 day of age. In the Sudan, Sunflower grain output increased sharply by 71.4% to reach 12 thousand tons in, 2004/05 seasons compared with 7 thousand tons in the previous season. This was due to the increase of 73.3% in area under cultivation from 15 thousand feddans in, 2003/04 to 26 thousand feddans in, 2004/05 seasons (Central Bank of Sudan, 2005). The objective of this study was to evaluate the effect of partial and complete replacement of groundnut cake with decorticated sunflower cake in broiler chicks diet on the performance of birds.

Materials and Methods

The experiment was conducted at the experimental poultry farm (open-house) of Faculty of Agricultural Technology and Fish Sciences, University of Elneelain, Jebel-Awlia, Khartoum South. Seventy two, one-day-old, unsexed commercial broiler chicks (Ross 308) were assigned into 12 pens in groups of 6 chicks in a pen. Each experimental diet was fed to 4 replicates, in a completely randomized design. Broiler chicks were kept on a deep litter floor system. Three experimental diets were formulated (0, 50 and 100 % replacement of GC with decorticated SFC) to meet or exceed the (NRC, 1994) requirements of broiler chicks. The diets were isonitrogenous and isocaloric. Feed and water were provided *ad-libitum*. Feed consumption, weight gain and feed conversion ratio were recorded weekly for the

Table 1: Determined analysis of decorticated sunflower cake

Item	%
Dry Matter	93.1
Crude Protein	41.04
Fat	16.8
Ash	7.63
Crude Fibre	10.0

individual replicate of each dietary treatment. Mortality was recorded as it occurred. Routine and occasional management, vaccination and medication were carried out as and when due. The experiment lasted six weeks (0-42 days). Minimum and maximum temperature were 27.2 and 40.7°C. Proximate analysis of sunflower cake was carried out according to official method of analysis of AOAC (1980). Table 1 shows determined analysis of decorticated sunflower cake. Calculated composition and analysis of experimental diets are shown in Table 2. The data generated from the experiment was subjected to analysis of variance. Least Significant Difference (LSD) test was used to assess significance of difference between means as described by Little and Hills (1978).

Results and Discussion

Tables 3, 4 and 5 show that replacement of GC with DSFC up to 100% had no significant effect (P>0.05) on feed consumption, body weight gain and feed efficiency of broiler chicks during starter, finisher or the whole period. Similar results were obtained by Mandal *et al.* (2003). The authors reported that inclusion of undecorticated sunflower meal at 0, 5 and 10% level replacing part of soybean meal in the broiler chicks diet had no significant (P>0.05) effect on body weight gain and feed intake during starter or finisher period. Moreover, Zatari and Sell (1990) found that inclusion of 10 or 20% sunflower meal (32.6% protein and 18.4% crude fibre) had no significant (P>0.05) effect on body weight gain of broiler chicks. In contrast to these findings, Mandal *et al.* (2003) mentioned that inclusion of 10% undecorticated sunflower meal replacing part of soybean meal significantly (P<0.05) decreased feed efficiency of broiler chicks during the whole period (0-7 week). Rama Rao *et al.* (2006) reported that, replacement of soybean meal with sunflower meal up to 67% in starter and 100% in finisher diet did not affect weight gain of broiler chicks, but total and 67% replacement of soybean meal with sunflower meal significantly depressed feed efficiency (P<0.05) at 21 and 42 day of age respectively. Contrary results may be due to the different methods of oil extraction which mainly affect the nutritional quality of sunflower meal (metabolizable energy, protein content and fibre content)

Table 2: Calculated composition and analysis of experimental diets

	Zero replacement of GC with DSFC		50% replacement of GC with DSFC		100% replacement of GC with DSFC	
Ingredients	Starter (%)	Finisher (%)	Starter (%)	Finisher (%)	Starter (%)	Finisher (%)
Sorghum	65.13	65.86	65.15	65.76	65.15	65.84
Groundnut Cake	26	18.5	13	9.25	-	-
Decorticated Sunflower Cake	-	-	13	9.25	27	19.5
Wheat Bran	2	9	2	9.18	1	8.1
Super Concentrate (L.N.P)	5	5	5	5	5	5
Lime Stone	0.81	0.78	0.95	0.76	1.18	0.92
Dicalcium Phosphate	0.43	0.32	0.27	0.26	0.05	0.1
Methionine	0.13	0.04	0.13	0.04	0.12	0.04
Vitamin (Premix)	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00	100.00
Calculated:						
Crude Protein (%)	22.14	20.18	21.88	20.02	21.87	20.08
Metabolizable Energy MJ/Kg	12.95	12.74	13.10	12.84	13.29	13.00
Lysine (%)	1.17	1.09	1.16	1.09	1.15	1.08
Methionine (%)	0.5	0.4	0.5	0.4	0.5	0.4
Calcium (%)	1.0	0.9	1.0	0.9	1.0	0.9
Available Phosphorous (%)	0.45	0.44	0.45	0.44	0.45	0.44

Table 3: Effect of partial or complete replacement of GC with DSFC on broiler chicks performance during starter period (0-3 weeks)

	Zero replacement of GC with DSFC	50% replacement of GC with DSFC	100% replacement of GC with DSFC	±SE	LSD 5%
Feed Consumption (gm/bird/week)	444[a]	440[a]	424[a]	6.53	20.9
Weight Gain (gm/bird/week)	181[a]	194[a]	187[a]	5.87	18.76
Feed Conversion Ratio (kg feed/ kg weight)	2.45[a]	2.27[a]	2.28[a]	0.07	0.22
Mortality (%)	0	0	0		

-Values are mean of four replicate groups of six birds each. SE: Standard error of the mean difference., a-c values in the same raw with different superscripts are significantly different.

Table 4: Effect of partial or complete replacement of GC with DSFC on broiler chicks performance during finisher period (4-6 weeks)

	Zero replacement of GC with DSFC	50% replacement of GC with DSFC	100% replacement of GC with DSFC	±SE	LSD 5%
Feed Consumption (gm/bird/week)	750.8[a]	742.5[a]	716.0[a]	29.37	93.97
Weight Gain (gm/bird/week)	335.3[a]	322.0[a]	332.5[a]	22.13	70.78
Feed Conversion Ratio (kg feed/ kg weight)	2.26[a]	2.38[a]	2.15[a]	0.17	0.55
Mortality (%)	4.16	8.33	4.16	NS	

-Values are mean of four replicate groups of six birds each, SE: Standard error of the mean difference, a-c values in the same raw with different superscripts are significantly different, -NS: Not significant

Table 5: Effect of partial or complete replacement of GC with DSFC on broiler chicks performance during whole period (0-6 weeks)

	Zero replacement of GC with DSFC	50% replacement of GC with DSFC	100% replacement of GC with DSFC	±SE	LSD 5%
Feed Consumption (gm/bird/week)	597.5[a]	591.5[a]	570.0[a]	15.44	49.39
Weight Gain (gm/bird/week)	258.5[a]	256.8[a]	260.0[a]	13.00	41.59
Feed Conversion Ratio (kg feed/ kg weight)	2.32[a]	2.34[a]	2.20[a]	0.12	0.38
Mortality (%)	4.16	8.33	4.16	NS	

-Values are mean of four replicate groups of six birds each, SE: Standard error of the mean difference, a-c values in the same raw with different superscripts are significantly different, -NS: Not significant

Table 6: Weekly average environmental temperature (°C)

No. of weeks	Maximum	Minimum	Mean
1st week	37.8	28.7	33.3
2nd week	35.7	27.4	31.6
3rd week	38.1	27.2	32.7
4th week	40.7	30.4	35.6
5th week	37.8	29.5	33.7
6th week	37.5	29.7	33.6

as reported by Mandarino (1997). Coombs and Hall (1999) pointed out that, the use of sunflower meal in animal feeding has been limited due to the high level of fibre content. In the present study, the decorticated sunflower cake was used, which contain low level of crude fibre as shown in Table 1. It is concluded that decorticated sunflower cake can replace up to 100% groundnut cake in broiler chicks starter and finisher diets. Now there is no difference in price of SFC and GC, but an encouragement of the use of SFC in broiler chicks diet will lead to development of locally available alternative, there by decreasing feed costs. Sunflower grain production in the Sudan in, 2003 was 5000 tons, increased in, 2005 to 12996 tons (Bank of Sudan, 2005).

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