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Effect of Groundnut Oil Waste (Booza) on Broiler Chicks Performance

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ABSTRACT

This experiment was conducted to evaluate the effect of feeding diets containing graded levels of groundnut oil production waste (Booza) as feed supplement on broilers performance. Four equal groups (1, 2, 3. and 4) of chicks were fed on diets containing (Booza) at 0%, 5%, 7.5%, and 10% respectively for five successive weeks. Live body weight, body weight gain, daily growth rate, feed consumption, feed conversion ratio and water consumption were evaluated. No Significant differences were appeared in live body weight, body weight gain, daily growth rate, feed consumption among the tested groups. Significant ($p \leq 0.05$) improvement was recorded in feed conversion ratio, while water consumption was increased significantly ($p \leq 0.05$) at 7.5% and 0% groundnut oil production waste. It was concluded that groundnut oil production waste can partially substitute groundnut cake .The study recommends the use of the Booza in poultry feed up to 10% without negative feedback.

INTRODUCTION

At the global level there has been a significant increase in population and consequently food insecurity. AOAD, (2012) indicated that the number of people chronically suffering undernourished might reached about 870 million people in the period from 2010 to 2012 . In addition to an estimate of an increase of 15% of the world's population. Studies showed that, Sudan population in a continuing increase, which estimated at about 20.1 million in 1980 (United Nations, World Population Prospects: The 2010 Revision).

At the beginning of the seventies nutritional awareness among the citizens of Khartoum State began a growing

demand for livestock products. The explosive increasing of population caused negative repercussions, including severe shortage of animal protein. Although Sudan has appreciable number of animals, but the prices of red meat are in a rapid rise. Recent people heading towards chicken meat as an alternative, especially in urban areas (Imad Eldin *et al.*, 2009).

Chicken meat, compared with other meat sources possessed high protein content and is equal with fish (Yasmine Probst, 2009). Despite the expansion in poultry production in Sudan, the Sudanese per capita consumption rate from chicken meat is low when compared with developing countries, Arabic countries and industrialized countries. This might be due to high cost of chicken meat production where feeds is one of the most important requirement of the poultry industry, accounting for70% of the total costs (AOAD, 1995). Oil seed cakes are by-product of vegetable oil production for edible and industrial purpose; (Peter, 2005).

Therefore, this experiment was designed to study the effect of feeding bouza on the performance broiler chicks, and its chemical composition and nutritive.

MATERIALS and METHODS

Experimental House: The experiment was conducted in an open side deep litter house. The house was divided into twelve sections of equal size area ($1m^2$) and 75cm walls height separate sections. Each section was provided with one feeder and drinker. The house had four lamps at 2m height and illuminated daily for 24 hours.

Birds: A total of one hundred and eight unsexed, one day old broiler chicks (Hubbard F15) were fetched from Arabic Company for Poultry. Birds were kept at the Poultry Farm of the College of Animal Production, Sudan University of Science and Technology and during the period from November to January 2013. The birds were divided randomly into four groups 27 each, each group consisted of twenty seven birds and each group was further subdivided into three replicates 9 birds each. The mean of initial weight was determined by the end of the first week for each treatment group. The ambient temperature during the experimental period ranged between 26.1 and 32.6 °C.

Experimental treatments and feeding trails: The experiment consisted of four groups designated as group (1) fed no Ground oil production (GOPW) waste (0%), group (2) fed (5%), group (3) fed (7.5%), and group (4) fed (10%),

Experimental diets consisted of pre-starter (from 1 to 7 day), starter (from 8 to 28day) and grower (from 29 to 42 day).The starter diets and the grower diets were formulated to be approximately iso-caloric and iso-nitrogenous to meet the nutrient requirements for broiler chicks as out lined by Agriculture National Research Council (NCR, 1994), Feed and water were supplied ad libitum.

Composition and calculated analysis of the starter and finisher diets for the different treatment: The composition and calculated analysis of the experimental diets were estimated according to the feed stuff analysis value as outlined by Yousif and Afaf, (1999) and Bolton and Blair (1994).

Table 1: Composition percent and calculated analysis of experimental diets in starter and grower period

Treatment	Starter %				Grower %			
Ingredients	Group1	Group 2	Group 3	Group 4	Group 1	Group 2	Group 3	Group 4
Sorghum	58.37	61.68	61.06	61.22	69.35	70.97	68.76	66.55
Wheat bran	1.8	0.11	1.13	1.79	3.09	2.79	5.19	7.72
G.N.C	30.35	25.11	22.49	19.75	19.64	14.44	11.7	8.93
Lime stone	0.8	0.9	61.06	0.9	0.9	0.9	0.9	0.85
Lysine	0.48	0.57	22.49	0.63	0.5	0.6	0.65	0.65
Methionine	0.04	0.06	61.06	0.08	0	0	0	0
Salt	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Veg.oil	2.39	0.8	0.5	0	1.2	0	0	0
Concentrate	5	5	5	5	5	5	5	5
G.N.Oil waste	0	5	7.5	10	0	5	7.5	10
Total	100	100	100	100	100	100	100	100
Calculated analysis								
ME (Mj/Kg)	13.39	13.39	13.39	13.40	13.39	13.41	13.40	13.39
CP%	23.00	23.00	23.01	23.01	20.00	20.03	20.01	20.00
CF%	4.71	4.57	4.68	4.67	4.10	4.11	4.35	4.61
Ca%	1.02	1.06	1.07	1.04	0.94	0.95	0.95	0.94
Av.P%	0.45	0.45	0.45	0.45	0.35	0.36	0.38	0.40
Lysine%	1.12	1.13	1.13	1.12	1.01	1.04	1.05	1.01
Metionine%	0.51	0.51	0.50	5.00	0.43	0.41	4.00	0.39

G.N.C= Groundnut oil production waste.
G.N.C.= Groundnut cake
CP= Crude protein.
CF= Crude fiber

Data collection: During rearing period live body weight (LBW), body weight gain (BWG), weekly growth rate (%), feed consumption (FC), feed conversion ratio (FCR) were recorded on weekly basis, while water consumption (WC), and mortality were recorded daily after day 7.

Chemical analysis: Approximate analysis was done at Nutrition Laboratory of the College of Animal Production, Sudan University of Science and Technology. The determination of total moisture, crude protein (CP), ether extracts (EE), crude fibre (CF) and ash were made according to the method of AOAC (1995). Metabolizable energy (ME) value was estimated according to the equation of Lodhi *et al* (1976).

Statistical analysis: Completely randomized design (CRD) was used. Data were subjected to analysis of variance (One –Way- ANOVA) and the means were tested for significance by least significant difference (LSD) using the Statistical Package of Social Science (SPSS) version 16.0 (2007) computer program. A probability of ($P \leq 0.05$) was required for statements of significance.

RESULTS

Chemical composition of groundnut oil industry waste: The chemical composition of groundnut oil production waste is presented in Table (2). The Groundnut oil production waste contained moisture (1.37), dry matter, (98.63%) crude protein (42.57%), Ether extract, (41.96%) crude fibre, (10.15%), ash, (3.62%) calcium, (0.30%) available phosphorus, (0.58%) nitrogen free extract, (0.33%) and metabolizable energy, (4093.83 KCal/kg).

Table 2: Chemical composition of groundnut oil production waste

Item	%
Moisture	1.37
Dry matter (DM)	98.63
Crude protein (CP)	42.57
Ether extract (EE)	41.96
Crude fibre (CF)	10.15
Total ash	3.62
NFE	0.33
ME (Cal/Kg)	4093.83

Live body weight (LBW) and body weight gain (BWG): Values of live body weight (LBW) and body weight gain (BWG) of broiler chicks fed on groundnut oil production waste are shown in Table (3). No significant differences were found among the different experimental groups during the experimental period in live body weight (LBW) and body weight gain (BWG).

Table 3: Effects of groundnut oil production waste on weekly broiler live body weight (LBW) and body weight gain (BWG)

Live body weight (LBW) (M± SD)

Treatment Week	Group1	Group2	Group3	Group4	Sign.
Initial weight	125.56±5.77	125.19±1.16	125.37±2.62	125.37±2.74	NS
2	326.67±12.94	291.48±18.93	314.26±12.60	306.11±25.07	NS
3	696.11±13.89	649.26±16.22	657.22±24.91	633.33±48.11	NS
4	1162.80±49.23	1078.30±39.63	1111.50±45.56	1097.40±83.45	NS
5	1639.60±85.36	1625.20±19.89	1574.30±77.35	1550.70±105.09	NS
6	2151.40±78.27	2114.70±140.36	2140.10±91.74	2137.00±151.33	NS

Body weight gain (BWG) (M± SD)

Treatment Week	Group1	Group2	Group3	Group4	Sign.
2	201.11±12.73	166.30±18.12	188.89±15.04	180.74±27.78	NS
3	369.44±10.29	357.78±16.51	342.96±15.30	327.22±23.15	NS
4	466.67±37.17	429.07±25.25	454.26±34.51	464.07±36.49	NS
5	476.85±36.26	546.85±46.51	462.78±35.89	453.33±33.28	NS
6	511.78±31.99	489.48±153.19	565.85±32.11	586.30±46.30	NS

NS means no significant difference

M± SD = Mean± Standard Deviation

Daily growth rate (DGR): Values of weekly growth rate (WGR) of chicks fed on groundnut oil production waste are shown in Table (4). No significant differences among the different experimental groups during the experimental period in weekly growth rate (WGR) were observed.

Table 4: Effects of groundnut oil production waste on broiler weekly growth rate (WGR)

Treatment Week	Group1M± SD	Group3M± SD	Group3M± SD	Group4M± SD	Sign.
2	28.73±1.82	23.76±2.59	26.98±2.15	25.82±3.97	NS
3	52.78±1.47	51.11±2.36	48.99±2.19	46.75±3.31	NS
4	66.67±5.31	61.30±3.61	64.89±4.93	66.30±5.21	NS
5	68.12±5.18	78.12±6.64	66.11±5.12	64.76±4.75	NS
6	73.11±4.57	69.92±21.88	80.84±4.59	83.76±6.61	NS

NS means no significant difference
M± SD = Mean± Standard Deviation

Feed consumption (FC) and feed conversion ratio (FCR): Feed consumption (FC) and feed conversion ratio (FCR) of broiler chicks fed on groundnut oil production waste are shown in Table (5). There was no significant difference in feed consumption between the different experimental groups during the experimental period given diet containing groundnut oil production waste.

Table 5: Effects of groundnut oil production waste on weekly broiler feed consumption (FC) (grams/bird) and Feed conversion ratio (FCR) (Gram feed /gram weight)

Treatment Week	Group1M± SD	Group2M± SD	Group3M± SD	Group4M± SD	Sign.
Feed consumption (FC)					
2	283.33±12.78	262.78±19.46	297.41±10.92	287.78±23.62	NS
3	578.15±15.52	590.00±18.58	573.52±14.75	578.33±19.74	NS
4	745.37±39.84	672.37±75.06	798.52±56.29	722.41±97.12	NS
5	947.04±38.89	941.30±53.97	990.93±50.56	888.33±68.81	NS
6	1066.2±63.20	1088.50±353.07	1248.90±87.03	1228.90±86.02	NS
Feed conversion ratio (FCR)					
Treatment Week	Group1M± SD	Group2M± SD	Group3M± SD	Group4M± SD	Sign.
2	1.40±0.03	1.58±0.07	1.58±0.07	1.61±0.26	NS
3	1.56±0.01	1.65±0.07	1.67±0.10	1.77±0.10	NS
4	1.60±0.04	1.56±0.9	1.76±0.07	1.56±0.25	NS
5	1.99 ± 0.09^{ab}	1.73 ± 0.23^{a}	2.14 ± 0.10^{ba}	1.96 ± 0.26^{ab}	*
6	2.08±0.02	2.22±0.08	2.21±0.10	2.10±0.03	NS

^{a,b} means the mean with different superscript in the same row are significantly different at P<0.05: NS means no significant difference: * Significance different P<0.05
M± SD = Mean± Standard Deviation

Water consumption (WC): Weekly water consumption (WC) of broiler chicks fed on groundnut oil production waste is shown in Table (6), birds fed 0%, and 7.5% Groundnut oil production waste recorded the higher significant (P<0.05) water consumption at two week.

Table 6: Effects of groundnut oil production waste on weekly broiler water consumption (ml/bird) (WC)

Treatment Week	Group1M± SD	Group2M± SD	Group3M± SD	Group4M± SD	Sign.
2	648.27±40.62[ab]	589.00±58.39[ba]	706.63±39.56[a]	585.00±25.02[ba]	*
3	1273.10±63.47	1289.80±84.18	1305.40±151.18	1235.60±61.16	NS
4	1774.60±80.99	1719.40±232.17	1846.50±18.38	1723.00±159.89	NS
5	2329.20±150.62	2224.90±96.67	2333.00±70.37	2219.00±60.82	NS
6	2320.60±222.23	2402.30±237.75	2446.90±96.69	2447.60±177.71	NS

[a,b] means the mean with different superscript in the same row are significantly different at P<0.05: NS means no significant difference: * Significance different P<0.05

M± SD = Mean± Standard Deviation

DISCUSSION

Groundnut oil industry waste was found consist of 98.63% dry matter which is higher than (DM) groundnut cake of (Yousif, and Afaf, 1999). Crude protein was 42.57%, it between the range of Eyo and Olatunde, (1998). Oil in groundnut oil waste was 41.57%, which is highest than the residues of oil processing (Woodroof, 1983). Groundnut oil waste contained 10.15% crude fibre, which is similar to groundnut caked (Yousif, and Afaf, 1999) , and CF values obtained by this study were higher than those reported by NRC (1994).. Also, the groundnut oil production waste contained 3.63% total ash, and 0.33% nitrogen free extract, which are lowest than that recorded by Yousif, and Afaf, (1999) for groundnut cake. The study of the chemical composition of groundnut oil production waste have generally been considered to be a highly digestible energy source (Jorgensen *et al*., 2000), which contained 4093.83 ME (KCal/Kg),in this study it is very highest than groundnut cake (ME) recorded by Yousif, and Afaf, (1999). However, the energy values were slightly lower than that reported by NRC (1994). The chemical composition of Groundnut oil production waste obtained in the present study compare well with the values reported by Marker and Becker (1997). The similarities in chemical composition with other studies indicated that environmental factors such as season, geographical location and stage of maturity play a minor role in determining nutritive value. The variability of nutritive value of groundnut oil production waste between different workers, indicate that its nutritive value probably is due to method of oil extraction, variety, soil fertility and analytical procedure used.

The result of live body weight, body weight gain, daily growth rate, showed no significant differences among the different experimental groups during the experimental period. This result agrees with Lee *et al*. (2003a) who stated that commercial essential oils mixture did not affect BWG of female broiler chick, and disagree with findings of Mukhtar (2011); Hernandez *et al*. (2004); and Tekeli *et al*. (2011), who reported positive effects of essential oils on body weight gain of broilers.

The average weekly feed consumption of treated groups numerically was slightly higher than that of the control, but without significance. Also the results of the present study, showed that chicks fed diets supplemented with groundnut production waste consumed significantly more feed compared to control group, which might attributed to improvement in the feed

taste, diet palatability enhancing chick's appetite (Hernandez *et al*., 2004). In feed conversion ratio (FCR) birds fed 0%, 5%, and 10% groundnut oil production waste recorded an improvement in (FCR), because it is a richest source of thiamine compared to the low content in cereals,(FAO, 2000) . The groundnut oil production waste consisted is 80% unsaturated fatty acid, which is more easily to be digested than saturated fatty acid (Cobb and Johnson, 1972). Birds fed with 0%, and 7.5% groundnut oil waste recorded the highest consumption of water, due to the oil content in groundnut oil waste which is known to increase the water consumption and the little increase in the feed consumption specially at 7.5% due to more palatability in the taste of feed, as reported by Stukie (1986) who indicated that, birds have a sense of taste.

CONCLUSION AND RECOMMENDATIONS

The study concludes that, graded addition of ground nut oil production had no negative effect on broilers performance up to 10%. The study recommends the use of groundnut oil production waste to replace ground nut cake and cereal grains meal on an equal base .Further studies are needed to investigate the inclusion of groundnut oil production waste above the 10% on the different performances on broiler or laying hens.

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