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ORIGINAL ARTICLE

EFFECTS OF FRYING OILS USED IN BROILER RATIONS ON PERFORMANCE

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ABSTRACT: This experiment was conducted to evaluate the response of broiler chicks fed diet containing 6% either fresh groundnut oil or after its frying (for once, twice or three times under 160C° for 1, 2 and 3 hours) respectively, as energy sources. Experimental parameters covered growth performance. The experimental design used was the complete randomized design. A total of (250) 7 day-old, 130 gm initial weight unsexed Ross 308 broiler chicks were used in this experiment. Chicks were divided into five groups of 50 birds in each and randomly assigned to five treatment diets, each treatment has five replicates. The first group A fed on control diet, the second group B were fed on diet containing fresh groundnut oil, the other groups of chicks were C, D and E fed on diet supplemented with groundnut oil fried for one, two and three times respectively. All diets in this experiment were formulated to be iso-nitrogenous (22.5% CP) and iso-caloric (3100 Mcal/Kg) according to the recommended dietary requirement for broiler (NRC, 1994). All chicks were fed on experiment diets for 6 weeks. The results indicated that addition of fresh groundnut oil and its fried oils improved the performance of broiler chicks, but the differences between treatment groups were closely similar and not significant with the highest values for group E compared with other treatment groups weight gain and feed intake respectively. The best feed conversion ratio for group D.The mortality rate was not influenced significantly by the dietary treatment.

KEYWORDS: Fried Groundnut Oil, Growth Performance, Broilers.

INTRODUCTION

Broilers are now produced almost entirely intensively, and in view of the large increases in feed costs, the system almost tended to be uneconomic unless, cheaper feeding options are arrived at. An increasing number of broilers are being grown to heavy weights to meet consumer demands for deboned poultry meat. As birds grow to older ages, the efficiency of utilizing feed declines, making it more important to minimize feed costs. Approximately 70% of the total cost of poultry diets is related to meeting energy needs (Skinner *et al.,* 1992). Thus, choosing the proper level of energy that will optimize growth, carcass quality and feed efficiency makes difference.

Fat as one of the essential substances in human and animal nutrition is an integral component of most foodstuffs and feeds. Fat is particularly regarded as energy-yielding nutrient. In recent years, attention has been focused on the dietetic and health effects off at. Dietetic effects of fat and oil depend primarily on the levels of individual fatty acids and on the mutual ratios of fatty acids (Krejčí-Treu *et al.,* 2009).

Oils are the most important energy source of broiler rations. In order to get the optimum productivity from chickens, the protein and energy levels of ration should be high. By compensation of energy requirements of chickens with oils instead of carbonhydrats, a better performance was attained (Sonaiya, 1988). It was reported that the performance varied according to the amount of the oil (Atteh *et al.,* 1983; Senkoylun, 1991a; Senkoylun, 1991b). Advantages of utilizing oils in poultry diet include decrease of nourishment dust, increase in absorption and digestion of lipoproteins, significance amount of necessary fatty acids and their lower heat toward carbohydrates and proteins. In addition, they assist vitamin A, vitamin E and Ca absorption (Leeson and Atteh, 1995).

Groundnut occupies an important protein as an oil seeds in many developing countries. The byproduct of oil extract (groundnut cake), is widely used as protein supplement in animal

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diets. Raw groundnuts contain 400-550 g/Kg oil (Blair, 2008). Groundnut oils have high smoke points relative to many others cooking oils, so is commonly used for frying foods. Groundnut is very important oil seed in Sudan beside cotton, sunflower and sesame seeds, groundnut oil had a blend odor and golden color. Most of Sudanese people prefer the crude form, which were used in many forms like butter (Dakoa). Roasting in the shell, in confections, cooking oil and the residue as animal feed (Balla, 2000). Groundnut oil is excellent oil for deep frying pastries shortening, oleomargarine, mayonnaise, salad dressing and other food product (Weiss, 1983).

Plant oils are traditionally used in poultry feed to suffice energy requirement and preserve sample space for other ingredients especially protein. To reduce the cost of poultry feed, now over half oil that use in the diet comes from kitchen or restaurant grease as keeper source of oil, which is primary vegetable oil that has been used for deep frying of food products. Vegetable oil heated under adverse condition (exposed to high oxygen level) for long period may reduce the metabolizable energy of the oil due to increase of polymer, free fatty acids or ring compounds which are less utilized sometimes to the extent of being anti-nutritional factors (Mansoor, 2003; APOC, 2004; MFN, 2004; TNC, 2008; Leo, 1992) formation, whereas the small increase in polymer and free fatty acids content of oil used under normal condition in restaurant has no discernible effect on the quality of the fat feeding to poultry (Janssen, 1985; Leo, 1992; Pesti *et al.*, 2002), and its energy could be comparable to the poultry fat (Lesson and summers, 2001).

Therefore, the present study designed to determine the effectiveness of dietary groundnut oil both in its intact fried forms as an internal energy component on the broiler performance.

MATERIALS AND METHODS

This experiment was carried out during summer season (March 25th – May 5th 2011). The ambient temperature ranged between 26ºC–39ºC during the experimental period. A total number of 250, 7- day–old commercial unsexed broiler of Ross 308 strain were purchased from (Arab Poultry Company**,** Ommat-Sudan), and transported to the student poultry premises, College of Agricultural Studies, Sudan University of Science and Technology, Shambat.

The chicks were adopted to the premises and fed over 7 days before the start of experiment. At the end of adaptation period, all chicks were weighed with an average initial weight of 130g. The chicks were then allotted randomly into five dietary treatment groups (A, B, C, D and E) in completely randomized design (CRD), each group was divided into five replicates, each of 10 chicks. Ground brooding/rearing system was adopted for 6 weeks experimental period. Chicks were bought vaccinated against Gumboro disease at 11 days of age through drinking water and Newcastle disease at 22 days of age using Lasota strain. Soluble multi-vitamin compounds were provided. Open wire mesh-side poultry house was used. The house was contained 25 pens partitioned with wire mesh, $1m^2$ of each, which was contained one feeder and one drinker. Light was provided approximately 24 hours light (natural/artificial). The groundnut oil used in this experiment was purchased from Khartoum North Market. The different types of fried oils were obtained by frying 3Kg of the mixture of Tamyyaa (Sudanese Falafel) ingredients. In groundnut oil in tefal fryer for one hour under 160 cº for one, two or three times. After each time of use in frying the oil was discarded and made available for broiler as feed oils. The broiler chicks fed on 5 dietary treatments. The first group A fed on control diet (without supplemental oil). The second group chicks fed on 6% groundnut oil, other groups C, D and E fed on 6% groundnut oil fried for one, two and three times respectively. All diets were formulated to be iso-nitrogenous (22.5%) CP and semi iso-caloric (3100 Mcal/Kg) being adequate in all nutrients, matching broiler chick requirements (NRC, 1994). Ration ingredients were sorghum, groundnut cake, wheat bran, concentrate, salt and limestone Table (1).

Average body weight, weight gain, feed consumption and feed conversion ratio for each group were determined weekly throughout experimental period. Health of the experimental stock and mortalities were closely observed.

2.1. Statistical Analysis

Data collected for broiler chick's performance were analyzed using One-way Analysis of variance (ANOVA). Frequency distribution was set and treatment means were compared for significance at the 5% level of probability (Obi, 1990).

Table 1: Percent inclusion rates (as fed basis) and calculated analysis (dry matter basis) of experimental diets fed to broiler chicks for 42 days

Ingredient	Diet A	Diet B	Diet C	Diet D	Diet E
Fetarita	60.50	40.00	40.00	40.00	40.00
Groundnut cake	27.50	29.00	29.00	29.00	29.00
Wheat bran	05.00	18.00	18.00	18.00	18.00
Oil	00.00	06.00	06.00	06.00	06.00
Salt	00.50	00.50	00.50	00.50	00.50
*Concentrate	05.00	05.00	05.00	05.00	05.00
Limestone	01.50	01.50	01.50	01.50	01.50
Calculated analysis					
Dry matter	94.50	94.60	94.70	94.60	94.70
Crude protein	23.44	24.29	23.76	24.10	21.73
Ether Extract	04.80	11.20	12.00	12.40	12.00
Crude Fiber	12.50	04.40	04.60	04.40	04.20
N.Free Extract	51.32	52.60	52.46	51.61	54.26
Ash	07.94	07.51	07.18	07.51	07.82
ME. Mcal/Kg	02.64	02.87	02.88	02.88	02.89

*crude protein 40%; crude fat 3.90%; crude fiber 1.44%; calcium 10%; available phosphorus 6.40%; energy 1950 K cal/Kg; Methionine 3% ; Methio + cystin 3.3% ; lysine 10 – 12 % ; crude minerals 39.30% ; sodium 2.77% ; linoleic acid 0.24% ; Nacl 6% ; Vitamins: vit. A 200.000 I.U/Kg ; D3 70.000 I.U/Kg ; Experiment 400 mg/Kg ; K3 30mg/Kg ; B1 50 mg/Kg ; B2 150 mg/Kg ; B6 50mg/Kg ; B12 180 mcg/Kg. D Pantothenic acid 155 mg/Kg ; Niacine 440 mg/Kg ; folic acid 8 mg/Kg ; choline chloride 5.800 mg/Kg ; Antioxydant (BHT) 1000 mg/Kg. Trace Elements; Manganise 1600 mg/Kg ; zinc 1600 mg/Kg ; Iron 580 mg/Kg ; copper 450 mg/Kg ; Iodine 55 mg/Kg ; selenium 8 mg/Kg ; Cobalt 9 mg/Kg ; Molbden 20 mg/Kg.

RESULT AND DISCUSSION

The results of this study concerning body weight gain, feed intake and feed conversion ratio, indicated clearly that the use of fresh groundnut oil and its fried oil improved performance parameters but not significantly Table (2). This agrees with Abdelgadir, (2009) who found that addition of olien oil and its fried oil in broiler diet at level 3, 6 or 9% improved the body weight gain, feed intake and feed efficiency, but the differences were not significant between treatment groups. Similarly, Leo (1992) reported no significant differences in body weight gain, feed efficiency fat retention or ME of diets between broiler chicks fed on fresh fat and commercial restaurant fried fat at level 1.1%. Also Pesti *et al.*, (2002) found no significant differences in live performance among broiler chicks fed on soybean oil, palm oil, restaurant fried oil, yellow grease, white grease, poultry grease and animal vegetable fat blend at levels 3 and 6%. Similarly, Atteh *et al.*, (1983); Sklan and Ayal (1989); Fan *et al.*, (1995); Anitha *et al.*, (2006) reported no significant differences in performance of broiler chicks fed various dietary vegetable oils. Throughout the experimental period of this experiment, the mortality rate was negligible with no differences among treatment groups. Dietary fresh groundnut oil and its fried oil had no significant effect on mortality rate and this was in line with report of Abdelgadir, (2009) who found that dietary cotton seed, olein and olein fried oil at level of inclusion reached 9% did not have any significant effect on mortality rate of broilers. Also, Atteh *et al.*, (1983) observed that addition of an animal vegetables fat blend had no effect on mortality at 3 weeks of age in male broiler. Hopkins and Nesheim (1967) reported that increasing levels of linoleic acid reduced the incidence of respiratory-related mortality in broilers. Similarly, Vanschoubroek *et al.*, (1971) reported that the addition of animal fat or vegetable oils at 4.5% to the chick ration had no effect on mortality.

Table 2: The effect of dietary fresh groundnut oil and its fried oil on the performance of broiler chicks

terms	SE±	$Lsd_{0.05}$	Groups				
			A	B	C	D	E
Initial weight g/bird	00.200	-	130	131	130	130	130
Final Weight g/bird	42.326	-	2183	2248	2283	2280	2301
Weight Gain g/bird	42.490	$125.3^{n.s}$	2053	2117	2153	2150	2171
Feed Intake g/bird	90.550	$267.1^{n.s}$	3869	4038	4058	4046	4123
F C R	00.063	$0.187^{n.s}$	1.89	1.91	1.89	1.88	1.91
Mortality%	00.283	$0.834^{n.s}$	4.00	4.00	4.00	4.00	4.00

Means in a raw do not different significantly (p>0.05). **Lsd =** least significant difference, **SE± =** standard error, **n.s =** not significantly difference (p>0.05), **A=** controlled group**. B=** fresh groundnut oil (6%), **C=** frying oil used for one time (6%), **D=** frying oil used for two times (6%)**. E=** frying oil used for three times (6%)

The results showed that inclusion of fresh oil or its fried oil to diet had no significant effects on feed intake. Abdelgadir, (2009), reported that the addition of plant oils (cotton seed oil, olein oil and frying olein oil) to the broiler ration had improved daily feed intake but not significantly.

Ali *et al.,* (2011); Rezaeipour *et al.,* (2011); Monfaredi *et al.,* (2011); Tabeidian *et al.,* (2005); Purushothaman *et al.,* (2005); Sanz *et al.,* (2000a); Carew *et al.,* (1964) found that the feed intake of broiler chick was not affected significantly by the different sources and levels of vegetable oils. DeGroote *et al.,* (1971) reported that energy intake was significantly improved by addition of fat (soybean oil and different animal fats including brown grease) than by glucose diet. Inclusion of fats (corn oil, palm oil, tallow, poultry and feed grade animal fat) increased feed intake (Fuller and Rendon, 1977). Atteh and Leeson, (1985) showed significant increase in food intake by saturated fatty acid supplementation. This was thought to be due to the fact that palmatic and stearic acids contributed very little energy to broiler diets. However, mixture of saturated and unsaturated fatty acids is fairly well utilized. It is known that there is synergism between animal fats and vegetable oils when added to the poultry diets. Rahimi *et al.,* (2011) showed that use of canola seed oil in the broiler diet has the lowering effect on feed intake. This might be due to the higher amount of ME in canola oil and the highest capability of digestion and absorption of unsaturated fatty acid that exists in CO. (as high content) is the main factor that birds can keep their energy received with reduction in feed intake.

The Daily weight gain was not affected significantly by dietary fresh groundnut oils and its fried oil in the present study. This could be supported by the findings of Abdelgadir, (2009), reported that the addition of plant oils (cotton seed oil, CSO and olein oil, CSO) to the broiler ration had improved daily body weight gain but not significantly, and the rate of gain decreased with OO and increased with OO with the FOO almost constant. Similarly, Ali *et al.,* (2011); Rezaeipour *et al.,* (2011); Purushothaman *et al.,* (2000) reported that the weight gain of broiler chicks was not affected significantly by the dietary vegetable oils. Increasing poultry fat (0.5 and 10%) in broiler diet resulted in increasing body weight gain and feed efficiency (Monfaredi *et al.,* 2011; Anitha *et al.,* 2006; Balvi and Cuskun, 2000; Tufft and Jensen, 1990; Stanley *et al.,* 1988). Also, Fuller and Rendon, (1977) reported that the addition of fat (corn oil, palm oil, poultry fat and feed grade animal fat) significantly increased body weight gain. Christmas and Harms, (1988) found an improvement in body weight gain when animal fat was added to broiler diets. Olomu and Baracos, (1989) reported that the source and concentration of dietary fat (corn oil, tallow and canola) significantly and positively affected weight gain of broilers.

The results of this study showed that Feed conversion ratio was improved when fresh groundnut oil and its fried oils added to poultry ration. This results were agreed with findings of Ali *et al.,* (2011); Rezaeipour *et al.,* (2011); Monfaredi *et al.,* (2011); Abdelgadir, (2009); Dewitt *et al.,* (2009); Anitha *et al.,* (2006); Valencia *et al.,* (1980); Christmas and Harms, (1988); Stanley *et al.,* (1988); Brake, (1989); Chung *et al.,* (1993) in which they found that using different levels and sources of dietary vegetable oils could not significantly affected the feed efficiency or improved the feed conversion ratio on broiler. Similarly, there was no significant different in feed conversion among different dietary fats (soybean oil and different animal fats including brown grease) even when fat was added up to 8% level (DeGroote *et al.,* 1971; Skinner *et al.,* 1989).

CONCLUSION

The used of fresh groundnut oil and its fried oils on broiler ration improved performance parameters but not significantly. The health of chicks did not affected by dietary treatments. So the fried oils can be used as energy source in broiler diets without any effects.

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