Feeding alternative source of fat to broilers

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Abstract: This study was performed to evaluate the effect of replacing typical soybean oil in broiler's diet with a less expensive commercial blend (kofat) on the performance of one strain of broilers. A total of 480-1d old lohamn chicks were obtained from a commercial hatchery and were placed in 8 pens. Two corn-soybean diets were introduced, one contained soybean oil while the other contained kofat as a source of fat in the diet. Each diet was assigned to 4 pens with 60 chicks in each pen for six week. Analysis of variance was performed using GLM procedure for a randomized complete block design. Feed efficiency, average daily gain and feed consumption were not significantly affected by fat source (P>0.05). On the other hand, parts yield, abdominal fat and cooking loss were not significantly affected by the treatment (P>0.05). Including kofat as the fat source of the broiler diets resulted in the same performance as in soy oil but the lower cost of kofat makes it an excellent fat source for broilers.
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1.Introduction

Generally fats and vegetable oils are frequently incorporated in broilers diet to increase the energy density of the diet, improve efficiency and increase digestibility of the diet (Fascina *et al.*, 2009; Monfaredi *et al.*, 2011). Soybean oil is the most commonly included oil in broilers feeds, however there are other sources can also be used, such as corn oil, palm oil, rapeseed oil, sunflower oil, cottonseed oil or coconut oil, depending on the cost and location where these oils are available (Baião and Lara, 2005; Barbour *et al.*, 2006). Animal fat could be used as well in broiler's diet however; there is a preference toward using oils from plant origin rather than using animal by-product sources in the Middle East region. So, the demand is great toward feeding low-price, plant fat sources.

According to Waldroup *et al.* (1995) the value of the various fats and oils depends on price, metabolizable energy content, digestibility and absorption. The high cost of supplemental energy necessitates the optimization of fat inclusion in broiler's diets especially during the finisher period where the feed consumption is the greatest.

Kofat (EcoOils, Malaysia) is formulated from mixture of various vegetable oils supplemented with anti-oxidant and lecithin. According to the manufacturers, the fatty acids composition profile of kofat are as follow: Myristic acid (C14:0) 6.0%, palmitic acid (C16:0) 30-35%, stearic acid (18:0) 4.0-5.0%, oleic acid (C18:1) 35.0-42.0% and linoleic acid (C18:2) 16-20%. Therefore, the objective of present study was to evaluate the effect of kofat as an alternative fat source on performance and carcass quality of broiler chickens.

2.Material and methods

A total of 480 one day old lohamn broiler chicks were obtained from a commercial hatchery and randomly distributed among 8 floor pens with wood shavings with 60 chicks per pen. Pen allocation in experiment was such that all pens had similar average the starting body weight. The birds were reared in a conventional poultry house with raised side windows. The birds were maintained a 24 h light schedule. Isocaloric and isonitrogenous corn-soybean meal diets were formulated to contain either soy oil or kofat as source of fat in the diet (Table 1). The starter diets (1 to 21 days of age) contained 21% CP and 3058 kcal of ME/kg on an as fed basis. In the finisher diet (d 22 to 42), CP and ME were 19% and 3140 kcal/kg, respectively. All other nutrients met or exceeded nutrient requirements of the broiler chicken (NRC, 1994). Feed and water were provided ad libitum.

Treatments were distributed following randomized complete block design, in which each experimental diet was fed to 4 replicate pens. The experimental unit was the pen mean. Significant treatment effects were determined using ANOVA. All analyses were conducted with general linear models procedure of SAS® Software (SAS Institute, 2002-2003).

Body weight and feed consumption were recorded by pen at 21, 35, and 42 days of age and feed conversion computed. At the end of the experiment, representative males per pen were

selected, weighed, and slaughtered. All viscera, abdominal fat, shanks and heads were removed. Parts yield and abdominal fat were weighted and recorded and then the left *pectoralis* muscle was deboned and weighed for cooking loss measurements.

3.Result and discussion

The effect of oil source added in broiler diets on feed efficiency and growth are shown in Table 2. The amount of feed consumed by birds and their body weight gain were not significant (P>0.05). As a result feed efficiency was similar among the two treatments at 21, 35 and 42 d of age. Similar response was obtained by Valencia *et al*. (1993) who reported that there were no effects of the sources of oil (refined palm oil, palm oil, corn oil and poultry fat) on weight gain and feed conversion of broilers. The effect of fats on live performance of broilers is well documented. It was reported that by increasing the proportion of supplemental animal-vegetable blend fat from 0 to 60 g/kg in an isocaloric diets, feed conversion was improved without any effects on the body weight, feed intake, carcass composition, or abdominal fat (Grffiths *et al*., 1997). Growth stimulating property of oil is not just a result of their high energy value, chicks fed diets with soybean oil or corn oil consumed more ME than chicks fed comparable diets that had low fat content (Carew *et al*., 1963).

The value of the various fats and oils is entirely dependent on their metabolizable energy (ME) contents, and the ME content of the fat should be dependent on their digestibility and absorption. In this experiment, birds received the two treatments had similar live performance; this led to the conclusion that the two fat sources have similar digestibility.

Carcass parameters of broiler chickens fed the two treatments are shown in Table 3. Treatment had no significant effects on dressing percentage, breast yield , leg quarter yield, abdominal fat or cooking loss (P>0.05).

Due to the high cost of feed ingredient for poultry especially dietary energy, it is important to continually evaluate the source as well as the level of energy in the diets (Pesti *et al*., 2002). Fat or oil supplementation occurs with major adjustments in corn and soybean meal level (Deaton, 1981). Supplementing the diets with fat source maybe more cost effective over the finisher period because of increased digestibility of fat and improved of dietary ME (Wiseman *et al*., 1989). Kofat is a cheaper source of fat compared to soybean oil or corn oil.

The effects of fat and vegetable oil need to be examined not only for production characteristics but also for meat quality and blood parameters relative to human health (Ozdogan and Aksit, 2003). The results of this study indicated that there were no differences in meat measurements (Table 3). The profile of fatty acids is of importance to the quality of the utilized lipid and to the absorption of these lipids by the animal, and also because it influences the quality of the fat deposited on the carcass. The fatty acid composition profile of Kofat is as follow: Myristic acid (C14:0) 6.0, palmitic acid (C16:0) 30-35, stearic acid (18:0) 4.0-5.0, oleic acid (C18:1) 35.0-42.0, and linoleic acid (C18:2) 16-20%. In this study there was no significant effect of fat source on abdominal fat (P>0.05). The location of fat deposition depends on the kind of fatty acid added to the diet (saturated and polyunsaturated). Birds fed with diets rich on animal saturated fatty acids tend to have proportionally larger abdominal and mesenteric fat than other fat deposits (Deaton et al., 1981).

In conclusion, the results of this study indicated that the replacement of soybean oil or corn oil with kofat resulted in comparable performance in terms of body weight, feed utilization, and carcass characteristics by broilers but using kofat as the fat source resulted in lowering the feed cost.

4.Conclusions

The results of this study indicated that the replacement of soybean oil with kofat resulted in comparable performance in terms of body weight gain, feed intake, feed conversion ratio, parts yield, abdominal fat and cooking loss but using kofat as the energy source could result in lowering the overall feed cost since it is cheaper commercial fat blend as compared to soybean oil. Based on the results obtained from this experiment and in order to lower the feed cost, it is recommended to feed kofat as a fat source for broilers.

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Table 1. Composition of the experimental diets

	Starter diet		Finisher diet	
	Diet1	Diet 2	Diet1	Diet 2
Ingredients(g/kg)				
Corn	605.2	605.2	658.3	658.3
Soybean meal (48% CP)	330.0	330.0	280.0	280.0
Soybean oil	25.0	-	28.0	-
Kofat©	-	25.0	-	28.0
Salt	3.0	3.0	3.0	3.0
Limestone	7.2	7.2	7.2	7.2
Di Calcium phosphate	23.0	23.0	17.0	17.0
DL-methionine	1.6	1.6	1.5	1.5
Vitamin-mineral premix[1]	3.0	3.0	3.0	3.0
Amprol	0.5	0.5	0.5	0.5
Choline chloride	1.5	1.5	1.5	1.5
Calculated analysis				
CP (%)	21	21	19	19
ME (Kcal/Kg)	3050	3050	3140	3140
Methionine (%)	0.51	0.51	0.48	0.48
Methionine + Cystine (%)	0.90	0.9	0.78	0.78
Lysine	1.10	1.1	1.0	1.0
Linoleic acid	2.80	1.96	3.07	2.12
Calcium	1.0	1.0	0.85	0.85
Phosphorus	0.45	0.45	0.35	0.35

[1]Amount supplied per Kilogram of diet : calcium carbonate, 1.32 g (calcium,0.5 g); vitamin A (retinyl acetate), 186.000IU ;vitamin D3 (cholecalaiferol), 3.720 ICU Vitamin E(DL-ά-tocopheryl acetate), 33.000IU; vitamin k(menadione sodium bissulfide), 5.4 mg; vitamin B1, 2.7mg; vitamin B2, 6.6vitamin B12, 1.65mg ; niacin, 53.1mg; folic acid ,1.65 mg ;pantothenic acid (calcium D-pantothenate) , 15.9 mg D-biotin, 6.6 mg ;choline , 300mg vitamin C 100mg ; butylated hydroxytoluene , 150mg ; 108mg;iron , 102 mg ; zinc, 77.4 mg copper, 16.1mg ; cobalt 0.16 mg; iodine 0.60 mg; selenium,0.4

Table 2. Effect oil source on body weight (BW) feed consumption and feed conversion (FC) of broilers at different ages.

Treatment				
Age	Soybean oil	Kofat	S.E.M	P-value
21 day				
BW(g)	690	691	±5.0	N.S
Feed (g)	1161.8	1108.4	±22.7	N.S
FC(g: g)	1.683	1.603	±0.027	N.S
35day				
BW(g)	1770	1796	±47.0	N.S
Feed (g)	3306	3229	±52.3	N.S
FC (g: g)	1.870	1.798	±0.049	N.S
42 day				
BW(g)	2247	2177	±38.2	N.S
Feed (g)	4401	4352	±89.0	N.S
FC (g: g)	1.95	2.000	±064	N.S

Table (3): Effect of oil source on processing characteristics of male broiler at 42day of age.
(Means of four replicate pens of 2 male per replicate)

Treatments				
	Soybean oil	Kofat	S.E.M	P-value
Dressing (%)	70.12	70.3	±0.21	N.S
Breast yield (% of dressed weight)	20.6	20.5	±0.124	N.S
Leg quarter yield (% of dressed weight)	33.93	33.95	±0.13	N.S
Abdominal fat (% of dressed weight)	2.35	2.48	±0.64	N.S
Cooking loss (%)	26.33	26.55	±0.23	N.S

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