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THE EFFECT OF ADDITION OF PEANUT OIL TO BROILER Chick DIETS

(With 9 Tables)

By

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(Received at 18/5/2011)

SUMMARY

An experiment was conducted to study the effect of varying levels of peanut oil supplementation for broiler diet, to assess feed intake, growth rate and feed conversion of broilers. The study also evaluated some of the qualitative and quantitative characteristics of meat produced from the broiler chicks. Oil was supplemented at 0.0, 1, 3 and 5% levels of the diet and formulated to meet nutrient requirements for broiler birds throughout the experimental period (47 days). Each diet was fed to 4 replicates of 8 birds each (128 birds). Addition of oil at 5% level had good effect on broiler performance, especially weight gain and feed conversion which was markedly improved. Abdominal fat accumulation was significantly increased with the diet containing 5% oil. The carcass composition (DM, ash, crude protein) were not increased among the treatments except ether extract which increased with increased level of oil supplementation.

Key words: *Broiler, supplementation, oils, performance.*

INTRODUCTION

The greatest part of the cost of a balanced poultry diet is incurred in providing energy. To discover the relative economy of using different energy sources an accurate and valid energetic evaluation system of poultry feeds is essential to compose the most economical rations. In

modern poultry feed formulation, where an increasing demand is made on linear programming techniques, the exact knowledge of the available energy content is of considerable importance. The inclusion or rejection of a particular feeding stuff in the least – cost ration is greatly dependent on the used energy values. (DeGroote *et al.*, 1970).

The use of fats and oils as important raw materials in the formulation of compound feeds for poultry has become firmly established throughout the animal feed industry, particularly with the interest in diets of high nutrient concentration employed in intensive system. Generally, it is recognized that they have approximately 2 to 2.5 times the energy yielding potential of carbohydrates. It is appreciated, however, that they are extremely variable commodities in terms of their dietary energy-yielding value, as a consequence of chemical structure of the constituent fatty acid and triglycerides. Furthermore, there is a considerable amount of confusion and misinformation relating to fats, particularly regarding the methodology employed in their evaluation. Interactions between them, such that it is often difficult to draw any firm conclusions relating to their nutritive value. With the increasing reliance on sophisticated linear programming packages in the feed industry, it is essential that reliable information relating to the nutritive value of available raw materials is at hand. Specifically, the dietary energy value is of considerable importance as this is usually the most expensive component of a compound feed. (Wiseman and Salvador, 1989).

MATERIALS and METHODS

A total of 200 broiler chicks (one day old) were used in this study. They are unsexed commercial (Hubbard) brought from coral company farms at soba- Khartoum and the experiment was conducted at poultry premises at the Animal Production Research Centre. The pens were cleaned and disinfected with formalin before the commencement of the experiment. The room temperature ranged between 25-42°C. Upon arrival, all chicks were selected, weighed, their mean body weight (42g). Four iso-nitrogenous, isocaloric diets were formulated. Analysis of the experimental diets were calculated and determined at the Animal Production Research Centre (Kuku) and shown in Table (1, 2 and 3). Diet A contained no fat (NF) and provided to all chicks for 6 days as an adaptation period. Then 128 healthy chicks were selected, with body weight ranged between 76-81gm. The 16 pens (8birds each) were

randomly allocated to the experimental diets A, B, C, and D with addition of peanut oil at 0%, 1%, 3% and 5%, respectively. The assumed ME values were 8800 kcal/kg for peanut oil according to NRC (1994). Each diet was randomly assigned to 4 replicate groups of 8 chicks.

Vitamins and antibiotics were administrated in the water for four consecutive days during the fifth week. Feed intake and body weight gain were calculated on a weekly basis. Mortality rate and the ambient temperatures were recorded throughout the experimental period. At the end of experiment, birds were fasted for overnight. Two birds from each replicate were randomly selected, leg labled, individually weighed and slaughtered. One hundred grams of thigh meat were obtained from different experimental birds for analysis purposes.

Statistical Analysis:

This experiment was conducted using a complete randomized design. The data obtained (feed intake, body weight gain and feed conversion ratio) were subjected to analysis of variance (one – way ANOVA) using computer programme (SPSS). The significance between treatment means was determined using Duncan's Multiple Range Test (DMRT).

RESULTS

Inclusion of 1% peanut oil in broiler diet significantly ($P<0.05$) improved feed intake during the third and sixth weeks compared with those receiving 3% peanut oil- supplemented diet (Table 4). During the fourth week, 1% peanut oil – supplemented diet significantly ($P<0.05$) improved feed intake compared to the control diet.

Although weight gain increases weekly yet, 1% and 5% peanut oil – supplemented diet had higher ($P<0.05$) body weight gain at the end of the second week compared to the control diet, whereas, 3% supplementation significantly improved body weight gain by the end of the fourth week (Table 5). Body weight during the third week up to the end of the experiment tended to increase with 5% peanut oil – supplemented diet, but it did not reach significant level (Table 5).

All oil – supplemented diets improved feed conversion ratio as compared to the control diet during the first four weeks (Table 6). In the second week, control diet had poor conversion ratio ($P<0.05$) compared

to that supplemented with 1 and 5% peanut oil. Whereas, inclusion of 5% peanut oil in the diet tended to decrease feed conversion during the fourth week up to the end of the experiment.

Although all groups receiving oil exhibited higher dressing percentage, the differences were not statistically significant ($p>0.05$) except in group fed 1% peanut oil compared to that fed the control diet (Table7).

Dressing percentage and accumulation of the abdominal fat tended to increase with increasing level of oil.

Inclusion of 5% peanut oil in broiler diet significantly increased ($p<0.05$) the accumulation of abdominal fat compared to the control diet. The chemical composition of the thigh meat presented that the addition of oil has no noticeable effect on dry matter, ash and crude protein percentages (Table 8). The ambient temperature through the experimental period are recorded in Table 9.

Table 1: Ingredient composition of experimental diet on percent basis.

Ingredient %	Treatment			
	A Control	B Peanut oil 1%	C Peanut oil 3%	D Peanut oil 5%
Sorghum	61.21	58.77	51.44	47
Nut cake, ground	29	29.5	29.50	29.50
Wheat bran	3	3	8.27	10.71
Super concentrate	5	5	5	5
Peanut oil	0	1	3	5
Limestone	1	2	2	2
Nacl	0.32	0.24	0.32	0.32
DL – lysine	0.27	0.28	0.26	0.26
DL – methionine	0.20	0.21	0.21	0.21
Total	100	100	100	100

*Super concentrate contains (%): CP 40; lysine 12; methionine 3; Ca 10; P4; methionine + cysteine= 2 and ME 2100kcal/kg.

** Vitamin and primex minerals provided per kg of diet: vit. A, 15000 IU; vit D3, 3000 IU; vit.

B1, 2 mg; viit. 5.5 mg; vit. B12 0.01 mg; D-calsium panthenate, 10 mg; vit. E, 5mg; vit. k 31 mg; Niacin, 25 mg; Choline chloride, 120mg; Ethoxyquine, 10 mg; Manganese oxide, 32.26mg; potassium oxide, 0.706 mg; Copper sulphate, 0.57mg; Zink oxide, 2.5mg; Copper oxide, 2.5mg and Ferrocabonate, 40.64mg.

Table 2: Calculated chemical composition (%) of the experimental diets.

Item	Treatment			
	A Control	B Peanut oil 1%	C Peanut oil 3%	D Peanut oil 5%
Crude protein	22.6	22.5	22.5	22.4
Metabolizable* energy (k cal./kg)	3027	3024	3035	3062
Calcium	1	1	1.32	1.32
Phosphorus, avouilable	0.5	0.5	0.55	0.55
Lysine	1.25	1.25	1.25	1.26
DL – methionine	0.5	0.5	0.51	0.51

*: Calculation based on analytical data of Sudanese feed obtained by Central Animal Nutrition Research Laboratory-Kuku.

Table 3: Determined chemical composition (%) of the experimental diet.

Nutrient	Treatment			
	A Control	B Peanut oil 1%	C Peanut oil 3%	D Peanut oil 5%
Crude protein	29.20	32.60	31.25	30.80
Ether extract	3.60	6.0	7.60	8.00
Ash	7.50	8.40	8.50	9.40
NFE	52.0	44.60	43.95	45.00
Crude fiber	3.40	4.00	4.80	6.70
Dry matter	95.70	95.60	96.10	96.90

Table 4: Weekly feed intake (g/bird/day) as affected by adding of peanut oil[1]:

Age (wk)	Treatments				
	A control	B Peanut oil 1%	C Peanut oil 3%	D Peanut oil 5%	SEM[2]
1	162.5	141.56	163.12	131.87	11.47
2	585.03	595.47	580.32	586.08	11.11
3	694.97^{ab}	729.68^{a}	676.1^{b}	690.31^{ab}	16.13
4	721.87^{b}	829.24^{a}	788.82^{ab}	771.56^{ab}	32.04
5	882.58	817.05	1066.10	1047.54	120.75
6	804.5^{ab}	1116.3^{a}	754.17^{b}	926.60^{ab}	106.66

[1]: Values are means of 4 replicates of 8 birds.
[2]: SEM: Standard error of the means.
a-b: Values within rows with different superscript differ significantly (P<0.05).

Table 5: Weekly weight gain (g/bird/day) as affected by adding of peanut oil[1].

Age (wk)	Treatments				
	A control	B Peanut oil 1%	C Peanut oil 3%	D Peanut oil 5%	SEM[2]
1	123.75	112.65	124.53	102.81	10.136
2	180.00^{b}	228.59^{a}	197.97^{bc}	210.31^{ab}	8.911
3	263.97	277.15	283.12	293.50	16.39
4	278.94^{b}	376.62^{ab}	404.65^{a}	373.72^{ab}	31.597
5	409.99	449.92	398.03	440.44	50.326
6	241.99	212.46	221.61	238.81	61.709

[1]:Values are means of 4 replicates of 8 birds.
[2]:SEM: Standard error of the means.
a-b: Values within rows with different superscript differ significantly (P<0.05).

Table 6: Weekly feed conversion ratio (kg feed/kg body weight gain) as affected by adding of peanut oil[1].

Age (wk)	Treatments				
	A control	B Peanut oil 1%	C Peanut oil 3%	D Peanut oil 5%	SEM[2]
1	1.34	1.27	1.29	1.28	0.081
2	3.27[a]	2.61[b]	2.94[ab]	2.79[b]	0.113
3	2.67	2.67	2.39	2.33	0.143
4	2.70	2.55	2.00	2.06	0.262
5	2.18	2.32	2.02	2.59	0.450
6	2.97	5.97	4.20	2.99	0.672

[1]: Values are means of 4 replicates of 8 birds.
[2]: SEM: Standard error of the means.
a-b: Values within rows with different superscript differ significantly (P<0.05).

Table 7: Effect of peanut oil supplementation on dressing percentage and the abdominal fat accumulation[1].

Treatment	Dressing %	Abdominal fat (g)
A	69.52[b]	15.42[b]
B	72.55[a]	20.88[ab]
C	70.95[ab]	21.48[ab]
D	71.63[ab]	22.22[a]
SEM	0.704	1.891

[1]: Values are means of 4 replicates of 2 birds.
[2]: SEM: Standard error of the means.
a-b: Values within columns with different superscript differ significantly (P<0.05).

Table 8: Chemical composition (%) of thigh meat.

	Diet A	Diet B	Diet C	Diet D
DM	29.50	28.80	23.10	22.5
Ash	1.30	1.40	1.40	1.10
Crude protein	18.64	19.90	20.08	19.98
Ether extract	2.50	4.5	2.84	7.30

[1]:Values are means of 4 samples tested.

Table 9: Average weekly values of maximum (Max) and minimum (Min) ambient temperature during the experimental period

	Temperature (°C)	
	Min	Max
Week1	34.5	40.4
Week2	30.7	39
Week3	32	40.7
Week4	31	40.6
Week5	29.5	38
Week6	31.5	40

DISCUSSION

The birds received dietary oil supplementation showed better performance in term of feed consumption, live weight gain and feed conversion than the control diet. Results showed that, during the first three weeks, birds that received the control diet consumed less feed than those received oil supplemented diets. The result is similar to the data presented by Serafin and Neshein (1970), which stated that young birds utilized fat less efficiently than the mature ones this is explained by inadequacy of bile salt in young birds. As the birds grow older, the addition of oil increases feed intake and thus consumed more energy than those received the control diet. These results were in line with Fuller and Mario (1977), who stated that the energy and nutrients intake were higher for all diets containing fats.

Inclusion of 1% and 3% peanut oil in broiler diet significantly ($P< 0.05$) increased body weight gain during the second and fourth weeks respectively, when compared to the control diet. These results confirm the data presented by Peebles *et al.* (1999) that the addition of 1.5 or 3% corn oil to the breeder diets increased body weight gain. Body weight gain was affected significantly ($P< 0.05$) by addition of oil at 5% during the second week. It tended to increase also the body weight from the third week up to the end of the experiment. Similarly Moran (1982); Brake (1989); Bohnsack *et al.* (2002), revealed that the addition of graded levels of fat in the diet improved body weight gain of the chicken.

The improved feed conversion ratio in the oil- supplemented diets during the second week supported the work of Gomez *et al.* (1987)

who reported that vegetable oils improved feed conversion ratio in the starter period 0 – 28 days. However, in the last two weeks, it was not affected by the addition of oil.

This result agreed with Peebles *et al.* (1999) who found that feed conversion ratio was reduced with addition of corn oil to breeder diets at 22-42 days. Inclusion of 5% peanut oil in the diet tended to decrease feed conversion ratio throughout the experiment period. These results were in line with Pesti *et al.* (2002) who showed that increasing fat level from 3 to 6% decreased feed conversion ratio.

In this study, dressing percentage was increased by the addition of oil in the broiler diets but the differences were not statistically significant. These results agree with Jonkey *et al.* (1976); Harms *et al.* (1957) who proved that the dressing percentage of broiler was significantly increased as the energy level of the diet increased. Inclusion of different levels of oil (1, 3 and 5%) in broiler diet increased the accumulation of abdominal fat compared to the control diet. Similar results were obtained by Baladinic and Haris (1957) who found that the addition of fat to broiler diets increases the abdominal fat deposition.

The chemical composition of the thigh meat presented that the addition of oil has no noticeable effect on dry matter, ash and crude protein percentages. This result confirms the data reported by Carew *et al.* (1964); Freeman (1983) that the dietary energy level alone has no effect on the broiler body composition. This was not in agreement with Olomu and Baracos (1989) findings.

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