Performance of broiler chickens fed diets containing different types of fat

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SUMMARY

The purpose of study was to observe the influence of supplied of different vegetable fat in different levels on main performance parameter for broiler (Cobb500).

This experiment was conducted in the Nawroz broiler's field in Asky-Kalak Mosul-Iraq. The effects of added dietary fat types and levels on broiler strain (Cobb500) breeder performance were evaluated in three treatments. Treatment one (T1) supplied with 5% traditional fat used in most farms of Iraq, palm oil treat by hydrogenation industry. Treatment two (T2) IS mixing from 2.5% vegetable hydrogenation “palm oil with 2.5% sunflower oil. Treatment three (T3) 5% included sunflower oil. Six repetitions were used to periodically estimate live body weight (LBW), feed intake (FI), weight gain (WG) and feed conversion ratio (FCR).

There were insignificant differences ($P<0.05$), in LBW by the treatments as the experiment advanced. The high value was (0.232g) at (1-14) breeding days for T3, (0.949g) value at the (15-28) breeding days for T1, and (2.272kg) at the end of the breeding period (29-42) days. Significant differences were observed among treatments for FI, WG and FCR at 29-42 days breeding period. High value for FI was in T2 (1.086), for WG was in T1 (0.721g). Best value for FCR was in T3 (1.469). Insignificant differences ($P<0.05$) among all treatments at the other period for all properties were mentioned. Significant differences ($P<0.05$) for production index (PI) among all treatments and best value was in T1 (218.34). Concluded of this study is an effect on diets including some different type of fat with different levels in middle period breeding on main performance properties of broiler (Cobb500).

Keywords: broiler performance, vegetable fat and production index

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INTRODUCTION

Population growth, urbanization, and improvement in per capita real income have spurred the growth of meat consumption in world. Broiler consumption has gained an Increasing share in the meat basket because of its relatively low price and religious restrictions on other meats (e.g., pork). (Jacinto, et al., 2004) Poultry diet formulation is based on the concept that poultry birds eat primarily their energy needs (NRC, 1994). The interaction between environmental temperature and feed intake is of utmost importance in the formulation of poultry diets for different climatic and geographical locations (Daghir et al., 2009).

The science of nutrition involves providing a balance of nutrients that best meets the animal needs for growth, maintenance egg production, etc. For economic reasons, this supply of nutrients should be at least coast, and so we must supply only enough for requirements, without there being any major excesses. It is very difficult and very expensive to supply all nutrients at the exact nutrient needs –rather we have to oversupply some nutrients in practical situation, in an attempt to meet the limiting nutrients. In poultry diets these limiting nutrients are usually energy and some of essential amino acids such as methionine and lysine. In formulating diets the following nutrients are considered energy, protein, fat, vitamins, mineral and water (Ensimenger et al., 1990a,b)

Poultry feeding is one of the most important aspects of poultry production. Therefore, for profitable poultry rearing, provision of economical and balanced feed is must. Among the constituents of poultry feed, fats supply concentrated form of energy (2.25 times more energy than carbohydrates and proteins). However, their inclusion as true fat or oil in the ration is limited because of the high risk of rancidity on prolong exposure to air, heat, sunlight and poor storage conditions (Linfield et al., 1985; Ali et al., 2000).

Unsaturated vegetable fats and oils can be transformed through partial or complete "hydrogenation" into fats and oils of higher melting point. The hydrogenation process involves "sparging" the oil at high temperature and pressure with hydrogen in the presence of a catalyst, typically a powdered nickel compound. As each carbon-carbon double-bond is chemically reduced to a single bond, two hydrogen atoms each form single bonds with the two carbon atoms (AL-Dalaly, 1993).

The purpose of this study was to observe the effects of the dietary include different type of fat with different level on broiler performance.

MATERIAL AND METHODS

Animals, growth trials and treatments

The animals were Coob500 non homogenized chickens for both sexes. They were kept for 42 days in cages, in order to be able to control feed intake and weight gain. Each cage contained 20 birds and each experimental group was made up with 6 cages (6 replicates), so that 120 birds were allotted to each treatment. The cages were 100 cm in wide, 150 cm length and 70 cm deep. Three groups of birds fed the diet supplemented with different type and level of vegetable fat to compare with others treatments.

Diet

Three different types of diet (Table 1) were produced with similar crude protein (Isonitrogenic) and energy (Isocaloric) levels also the vitamins and minerals concentrations were the same.

Table 1. Nutrient composition of the experiments

Feedstuffs %	Treatment					
	Starter (1-28 days age)			Finisher (29-42 days age)		
	T1	T2	T3	T1	T2	T3
Wheat	52.43	52.43	52.43	64.82	64.82	64.82
Soya bean meal	38.60	38.60	38.60	25.46	25.46	25.46
Vegetable fat	5	2.5	-----	5	2.5	-------
Sunflower oil	------	2.5	5	------	2.5	5
Metheonine	0.097	0.097	0.097	0.080	0.080	0.080
Lime stone	0.80	0.80	0.80	0.910	0.910	0.910
Di Cali-pho	0.40	0.40	0.40	0.33	0.33	0.33
Avienzyme (commercial)	0.90	0.90	0.90	0.90	0.90	0.90
Vitamin-mineral premix*	2.50	2.50	2.50	2.50	2.50	2.50
Total	100.00	100.00	100.00	100.00	100.00	100.00
Chemical comparison of rations **						
Mj.kg--	12.34	12.31	12.31	12.76	12.76	12.74
%C.P	23	23	23	19	19	19.01
Energy: CP	127.8	127.9	127.8	160.5	160.5	160.1
%C.F	4.23	4.23	4.23	3.70	3.70	3.70
%Ca	1	1	1	1	1	1
%P	0.45	0.45	0.45	0.42	0.42	0.42
%Na	0.17	0.17	0.17	0.17	0.17	0.17
%Lysine	1.38	1.38	1.38	1.06	1.06	1.06
%Metheonine	0.58	0.58	0.58	0.52	0.52	0.52
%Meth+%Cystine	0.92	0.92	0.92	0.80	0.80	0.80
Linolic acid	3.26	3.26	3.26	3.23	3.23	3.23

*Vitamin and Mineral Premix at 2.50% of the diet supplies the following per kg of the diet : Vit A 1000 IU ;Vit D3 3000 IU;Vit E 20 mg; VitK3 3mg ;Vit B12 mg ;Vit B2 6 mg;Vit B 65mg ; Vit B 12 20 mg ; Niacin 66 mg ; Pantothenic acid 10 mg ;Folic acid 1 mg ;Biotin 0.5mg ; Cholin Chlorid ,500mg ; Mn ,100mg;Cu,8 mg ; Fe,100 Zn, 75 mg ;Co,10 mg and Se ,10mg .**According to NRC, 1994

Experimental procedures

Live body weight, daily weight gain and feed intake were determined by weighing individual chickens overnight at age of 14, 28, and 42 days with an accuracy of ± 5 grams. Initial body weights were similar among groups, prior to diet allocation (average = 41 g/bird). Feed conversion ratio and production index calculated by mathematical equation

$$\text{*Production index (PI)} = \frac{\text{Average live body weight (g)}}{\text{Number of rearing days} \times \text{number of days of food conversion efficiency} \times 10} \times \text{proportion of vitals}$$

(Naji and Hamdy, 1989)

Statistical analysis

For the statistical design and data analyses, complete random design an experiment with 4 treatments were determined. Data in all experiments were subjected to ANOVA procedures appropriate for a completely randomized design and the significance of differences between the means estimated using Duncan test (Duncan's new multiple range test). Probability level of $P<0.05$ was considered for Significance in all comparisons. Values in percentage were subjected to transformation of Arc sin v100. All statistical analyses were performed using the software SPSS 11.5 for Windows® (SPSS Inc., Chicago, IL).

RESULTS AND DISCUSSION

The major goal of broiler breeding was to obtain a quality and quantity live body weight. This target cannot executed without planning of a good nutrient system with minimum cost and maximum economic income because the cost proposition of diet's forming total breeding cost formed that around 65-70%. (Ensmingers, 1990a).

Live body weight

The final LBW (Table 2) observed there were insignificant differences ($P<0.05$) amount among all treatments periodicity over measurement ages but there are arithmetic differences between all treatments. The best value was in T3 (0.232g) at first period followed by T1 and T2 respectively. This may be attributing to the lipase enzymes is non activation in this period of ages which is low secretion, because in the beginning of growth the bile bladder is small At second period the best value was in T1 followed by T3 and T2 respectively. At the last periods of breeding the best value was for T3 followed by T1 and T2 respectively. This result is confirmed by (Mala et al., 2004) while they used different sort of fats with differential ages. The increasing of live body weight at the end of experiment for T3 even there were insignificant differences ($P<0.05$) among all treatment can be attribute to type of unsaturated fat and

at advantage ages improving of digestive system and bile salt can emulate better for fat to covert unsaturated fatty acids this can be easy for absorption by small intestine (Abou-Alwafa, 1988; Lesson,and Zubair., 2005)

Table 2. Effective treatment and periodically ages between live body weight, Feed Intake, Weight excess Feed conversion ratio production index (PI)

Treatments	Periods	Attributes				
		Live bodyweight	Feed intake	Weight gain	FCR	Production Index PI
T1, 5%Vegetable fat(hydrogenation palm oil)	1-14 days	0.228±0.02	0.382±0.01	0.185±0.019	2.084 ±0.17	
	15-28 days	0.949±.0.6	1.055±0.02^{b}	0.721±0.05^{b}	1.469±0.10^{a}	
	29-42 days	2.260±0.12	2.760±0.27	1.311±0.12	2.11±0.21	218.34±0.27^{c}
T2, 2.5% Vegetable fat (hydrogenation palm oil) +2.5% sunflower oil	1-14 days	0.224±0.02	0.371 ±0.03	0.183±0.023	2.048±0.19	
	15-28 days	0.868±0.084	1.086±0.03^{b}	0.644±0.07^{a}	1.704±0.20^{b}	
	29-42 days	2.167±0.12	2.690±0.0.07	1.299±0.09	2.079±0.17	192.88±2.95^{a}
T3, 5%Sunflower oil	1-14 days	0.232±0.02	0.376±0.01	0.191±0.178	1.991±0.22	
	15-28 days	0.925±0.03	0,958±0.08^{a}	0.693±0.03^{ab}	1.383±0.12^{a}	
	29-42 days	2.272±.0.15	2.923±0.15	1.346±0.15	2.192±0.24	214.71±2.74^{b}

$^{a.,b.c}$ means with different superscript within row are significantly different (P< 0.05) and values will increase from (a) to (c) value .Values are $\bar{x}$ ± Std. Deviation of 120 birds

Feed intake

Feed intake results are shown in Table 2 there were significant differences (P<0.05) between T3 and each of T1, T2 at the second breeding period wherever there are no significant differences (P<0.05) between them at the same ages (28days). This can be explain by improve of digestive system and increase physiological for appetite with different type of fat by mixing unsaturated and saturated fat. This result agrees with result of Aggoor (2000).

Weight gain and feed conversion ratio

Obviously reflected in these results in table 2 for gain weighted and feed conversion ratio were significant differences (P<0.05) at second period and because of their arithmetical relationship. High value for WG was in T1 (0.721g) followed by T3 and T1 respectively. This can be attribute for metabolic catalyze type of fat by ß-oxidation cycle for fat (AL-Dalaly, 1993).and reason of that increasing cycle because of converging oil from unsaturated to saturated by hydrogenation process. On other hand this lead to decrease for FCR pointed to T1 (1.383) which the best value for it followed by T1 and T2 respectively. These results are consistent with (Kermanshahi et al., 2000). Sanz et al., (2000)

results are inconsistent with these results, He explained that if diet of broilers consisted of saturated fatty acids the amount of feed consumption will decrease, because of the content high energy in feeds. This sort reduces the bird's appetite.

Production index

This indicator is arithmetic index for success or fail project because it related with many factors as mentioned before. The average of this index is around 180-250 (Naji and Hamdy, 1989). Table 2 pointed that there were significant differences ($P<0.05$). High value was in T 1 followed by T3 and T1. This result can be explained by mathematical calculated related with best value of FCR and increase of LBW.

CONCLUSIONS

From above results we can concluded the following points: the best LBW were obtain from the treatment which supplied diet by unsaturated fat (sunflower oil); the best economic treatment is for utilization palm oil which hydrogenised process, because reduce coast of feeding with increase of LBW.

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