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Effect of Canola Oil on the Internal Organs and Carcass Weight of Broilers Chickens

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Abstract: This experiment was carried out to evaluation usage different levels of Canola Oil (CO) (0, 2 and 4 %) in the basal diet (corn and soybean meal) and their effects on the different parts of carcass weight (breast and thigh) and internal organs weight (liver, heart, spleen, gizzard, proventriculus and abdominal fat) in broiler chick's. A total of 90 Ross 308 strain mail broiler were randomly divided in to 3 experimental treatments with 3 replicates (10 chicks per pen) and arranged in a completely randomized design. The experimental period lasted 6 weeks and during this period, the birds had free access to feed and water. Experimental diets consisted of: Basal diet 0% canola oil, basal diet with 2% canola oil and basal diet with 4% canola oil. These diets were isonitrogenous and isoenergetic were given to broiler chickens throughout a 42 days growth period. Data was analyzed with one way ANOVA and means compared with Duncan test. Three male birds selected with each pen and slaughtered. Result showed canola oil in levels of 4 and 2% (T3 and T2, respectively) significantly increase the chilled carcass weight, breasts, thighs, livers and spleens weight ($p<0.0001$), in relationship to basal diet, as the 3 treatment include of 4% canola oil has a highest effects. Too canola oil in levels of 4 and 2% (T3 and T2, respectively) increase the gizzards and hearts weight, respectively but not significantly. Result showed canola oil in levels of 4 and 2% (T3 and T2, respectively) significantly decrease the abdominal fat deposition ($p<0.0001$) in relationship to basal diet, as the 3 treatment include of 4% canola oil has a highest effects.

Key words: Broiler, canola oil, internal organs and carcass

INTRODUCTION

Oils have commonly been used as energy sources in the diets for broiler chicks especially in grower and finisher period. Broiler industry is increasing dramatically throughout the developing countries. There have been a notable increase in growth rate and feed efficiency in commercial broiler chickens in last 30 years. Nowadays, human need a foremost food for a attain the best peace. Hereof, advert to alimentation of human is very important for a nutrition critic. Current commercial hybrids with high performance require high energy diets which would enable the maximum exploitation of those genetic potential. Canola oil provides varying quantities of the essential nutrient good fatty acids. Canola oil is an excellent source of good fats. It is very high in monounsaturated fat, contains intermediate amounts of the precursor omega-6 and omega-3 polyunsaturated fatty acids linoleic acid (LA) and alpha-linolenic acid (ALA) respectively and is very low in saturated fat. Canola oil as a good contains significant amounts of vitamin E and phytosterols. The aims of this study are the evaluations improvement of the carcass yield and internal organs weight with consumption of dissimilar canola oil in diets.

MATERIALS AND METHODS

Animals and diets: A total of 90, one-day old broiler chicks of a commercial strain (Ross-308) from mail sex were placed in 9 pens of 2×2 m with 10 birds per each pen. Feed and water were provided ad libitum. The experimental design consisted in a completely randomized design with 3 treatments [T1 Control (soybean + corn), T2 (2% CO) and T3 (4% CO)] with 3 replication. The treatment diets of were isonitrogenous and isoenergetic. Diets were formulated by adding 0, 2 and 4% canola oil be based diet (corn and soybean meal) that met requirement recommended by the National Research Council (1994).

The control diet, which was not enriched with canola oil and was administered throughout the 21 days of experimental period (starter). The levels of canola oil were replaced with corn in diets during 2 different periods (grower and finisher). Ingredient composition and nutrient analysis for each treatment is described in Table 1-3.

In the end of experiment, 3 birds from each replicate were slaughtered and different part of body weighted. Mortality was also recorded for each treatment.

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Table 1: Percentage composition of experimental diet in starter period

Ingredients	(%)
Corn	53.5
Soybean	34
Canola oil	0.5
Starch	8
Wheat bran	0
DL-Methionine	0.54
Lysine	0
DCP	1.38
Oyster	1.33
Vitamin	0.25
Mineral	0.25
Salt	0.25
Coccidiostat	0
Sand	0
	100
Calculated nutrient content	
ME kcal/kg	2920
Crude protein (%)	21
Calcium (%)	0.94
Available P (%)	0.43
ME/CP	139.7
Ca/P	2.1

1: Vitamin content of diets provided per kilogram of diet: vitamin A, D, E and K.2: Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000 mg; Zn, 80,000 mg; Fe, 90,000 mg; Cu, 15,000 mg; I, 1,600 mg; Se, 500 mg; Co, 600 mg

Table 2: Percentage composition of experimental diet in grower period

	Experimental diets		
Ingredient	T1	T2	T3
Corn	64	60	55
Soybean	27.4	28	27.1
Canola oil	0	2	4
Starch	3.74	2.06	1.22
Wheat bran	1	2	5.5
DL-Methionine	0	0	0
Lysine	0	0	0
DCP	1.13	1.14	1.16
Oyster	1.5	1.48	1.46
Vitamin	0.25	0.25	0.25
Mineral	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Coccidiostat	0.15	0.15	0.15
Sand	0.33	2.42	3.66
	100	100	100
Calculated nutrient content			
ME kcal/kg	2920	2920	2920
Crude protein (%)	18.2	18.2	18.2
Calcium (%)	0.9	0.9	0.9
Available P (%)	0.35	0.35	0.35
ME/CP	160.1	160.8	160.7
Ca/P	2.5	2.5	2.5

1: Vitamin content of diets provided per kilogram of diet: vitamin A, D, E and K.2: Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000 mg; Zn, 80,000 mg; Fe, 90,000 mg; Cu, 15,000 mg; I, 1,600 mg; Se, 500 mg; Co, 600 mg

Statistical analyses: Data were analyzed in a complete randomized design using the GLM procedure of SAS (2000) version 12:

$$Y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

Table 3: Percentage composition of experimental diet in finisher period

	Experimental diets		
Ingredient	T1	T2	T3
Corn	66.5	57.5	56
Soybean	24.1	25.85	24
Canola oil	0	2	4
Starch	3.81	4.34	1.94
Wheat bran	0	5	6
DL-Methionine	0.44	0.45	0.45
Lysine	0.043	0.015	0.08
DCP	0.89	0.92	0.89
Oyster	1.38	1.36	1.31
Vitamin	0.25	0.25	0.25
Mineral	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Coccidiostat	0.15	0.15	0.15
Sand	1.937	1.665	4.43
	100	100	100
Calculated nutrient content			
ME kcal/kg	2920	2920	2920
Crude protein (%)	16.5	16.4	16.5
Calcium (%)	0.79	0.79	0.77
Available P (%)	0.3	0.3	0.3
ME/CP	176.8	177.4	176.6
Ca/P	2.6	2.6	2.6

1: Vitamin content of diets provided per kilogram of diet: vitamin A, D, E and K.2: Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000 mg; Zn, 80,000 mg; Fe, 90,000 mg; Cu, 15,000 mg; I, 1,600 mg; Se, 500 mg; Co, 600 mg

Where:

Y_{ij} = All dependent variable.
μ = Overall mean.
α_i = The fixes effect of oil levels (i = 1, 2, 3).
ε_{ij} = The random effect of residual.

Duncan multiple ranges used to compare means.

RESULTS AND DISCUSSION

Carcass weight: Result for carcass weight shown in Table 4. Result shows that with usage high levels of canola oil in experimental diet (T3 = 4% canola oil and T2 = 2% canola oil, respectively) significantly increase the carcass, breasts and thighs weights ($p<0.0001$) in relationship to basal diet, as the 3 treatment include of 4% canola oil has a highest effects, while, chilled carcass weight for control diet (T1 = without canola oil) 88.75 reached to 101.92 and 117.58 for T2 (2% canola oil) and T3 (4% canola oil), respectively and breasts weight for control diet (T1 = without canola oil) 20.58 reached to 23.08 and 24.13 for T2 (2% canola oil) and T3 (4% canola oil), respectively and thighs weight for control diet (T1 = without canola oil) 11.92 reached to 19.51 and 27.10 for T2 (2% canola oil) and T3 (4% canola oil), respectively. In the some experiments, it has showed the presence of canola oil in diets improved the meat yield and carcass weight (breast and thigh) in broiler (Nelson *et al*., 2005; Clark *et al*., 2001; Newkirk and Classen, 2002).

Table 4: Least square means for carcass, breast and thigh weight

	Treatment				
	T1	T2	T3	SEM	p>F
Carcass weight	88.75b	101.92a	117.58a	9.586444	0.0001
Breast weight	11.92c	19.51b	27.10a	0.405869	0.0001
Thigh weight	20.58bc	23.08ab	24.13ab	0.512589	0.0001

Table 5: Least square means for carcass, breast and thigh weight

	Treatment				
	T1	T2	T3	SEM	p>F
Liver weight	1.7066b	1.7733b	1.96a	0.11544	0.0001
Spleen weight	0.0719ab	0.0702b	0.0747a	0.02533	0.0001
Heart weight	0.398bc	0.411b	0.455a	0.05666	0.0011
Gizzard weight	1.9107a	1.9118a	1.9214a	0.12444	0.0121
Proventriculus weight	0.35142a	0.42677b	0.55413c	0.06648	0.0221
Abdominal fat	141.35a	108.28b	91.88c	10.22365	0.0001

These finding is an according with this study finding. Whitherward these researchers has reported the presence of canola oil in diets improved the feed intake and feed conversion ratio in the broiler chickens, so it has seem the increase of the carcass weight in relationship with the improvement of feed intake and feed conversion ratio in broiler. Talebali and Farzinpour (2005) it has reported the canola seed increased the carcass and breast weight in the broilers; they were give this effect on the high levels of oil in canola seed.

Internal organs weight: Result for internal organs weight shown in Table 5. Result shown that with usage high levels of canola oil in experimental diet (T3 = 4% canola oil and T2 = 2% canola oil, respectively) significantly increase the livers and spleens weight, ($p<0.0001$) in relationship to basal diet, as the 3 treatment include of 4% canola oil has a highest effects and too result shown that with usage high levels of canola oil in experimental diet (T3 = 4% canola oil and T2 = 2% canola oil, respectively) numerically increase gizzards and hearts weight, respectively but not significantly. Result showed canola oil in levels of 4 and 2% (T3 and T2, respectively) significantly decrease the abdominal fat deposition ($p<0.0001$) in relationship to basal diet, as the 3 treatment include of 4% canola oil has a highest effects. Proventriculus weight is significantly affected with the different levels of canola oil in all treatment.

In the some experiments, it has showed the presence of fat in the diet decrease the livers and spleens weights in the broilers chicks (Latour, 1994; Shephard, 1989) and some researchers report in their studies, the consumption different levels of fat in broiler diets has no affected on the livers and spleen weights (Talebali and Farzinpour, 2005; Lesson and Summers, 2001). But many researchers it has shown the consumption different levels of fat in broiler diets significantly increase livers and spleens weights in the broiler chickens, therefore the increase of the liver action for the high levels of fat metabolism (Pourreza *et al*., 2005), so the last researchs corroborant the present study, as the canola oil has increase the liver weight in broiler chicks. Peres and Maldonado (2001) has shown the consumption of different levels of canola seed in broiler diets, increase the hearts and gizzards weight in broiler chicks. Those researchers give recognize these finding in relationship with transport of fats in the fat deposition in afar the heart. These finding in corresponding with our study because the canola oil can be numerically increase the hearts weight in this research but no significantly.

In the many of research proventriculus weight not measured, accordingly no that the good references about the effects of fats on the proventriculus weights and size, but in this study it has showed that with usage high levels of canola oil in experimental diet (T3 = 4% canola oil and T2 = 2% canola oil, respectively) significantly increase proventriculus weight in the broiler. The primary objective of the present trial was to evaluate if dietary linoleic acid (LA) supplementation use in diet, decrease significantly abdominal fats. In a recent study shown that with usage high levels of canola oil in experimental diet (T3 = 4% canola oil and T2 = 2% canola oil, respectively) significantly increase abdominal fats respectively in broiler since the canola oil has an excellent source of linolec acid.

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