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Canola Oil Could Affect PUFA and MUFA Content of Abdominal Fat of Azerbaijan Native Turkey?

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Abstract: This research was performed to investigate effect of dietary Canola oil on abdominal fat PUFA and MUFA percentage. Ninety male Iranian native turkeys were randomly distributed into three experimental treatments and each treatment in three replicate. These diets were isonitrogenous and isoenergetic were given to broiler chickens throughout a 20 week growth period. Fatty acids profiles with Gas Chromatography (GC) technique were measured. Data was analyzed with one way ANOVA and means compared with Duncan test. Result show that PUFA content were increased and MUFA were decreased with usage of canola oil and approximately no difference between levels of canola oil, thus we can suggest 2.5% of canola oil could improve abdominal fat quality.

Key words: Abdominal fat, MUFA, PUFA, Turkey

INTRODUCTION

Fat and oil is very palatable and in food industry use this product for proceeded meat such as salami and etc. The modification of the ratio of fatty acids in meat products could be achieved by replacement of animal fat with vegetable oils as vegetable oils are a rich source of PUFAs (Jiménez-Colmenero, 2007). Canola oil is good source of omega3 fatty acids and easily could usage in poultry diet as energy source and for improve meat and fat quality. Dietary intake of omega-3 fatty acids decreases the risk of heart disease (Temple, 1996) and plays an important role in preventing cancer (Pandalai *et al*., 1996). Many research studies have been carried out on the incorporation of vegetable oils to meat products to increase PUFA levels (Bloukas *et al*., 1997; Muguerza *et al*., 2002, Severini *et al*., 2003; Ansorena and Astiasaran, 2004 and Jiménez-Colmenero *et al*., 2001). The aim of this research were to evaluated canola oil effects on the PUFA and MUFA content of abdominal fat of east Azerbaijan native turkey.

MATERIALS AND METHODS

Birds and diet: This experiment were performediIn east Azarbaijan Research Center for Agriculture and Natural Resources (Tatar Research Station). The investigation was performed on 90 male native Iranian turkeys in their fattening period (from 4th to 20th week of age). The turkey chicks with completely randomized design of 3 treatments, with 3 repetitions and 10 chicks in each box were fed experimental diets containing 0% CO, 2.5% CO and 5% CO in the fattening period. The experimental diets formulated isonitrogenouse and isoenergetic, accordance with the 1994 recommendations of the National Research Council (Table 1). The birds were given access to water and diets ad-libitum. The composition and calculated nutrient composition of the treatment diet is shown in Table 1. At the end of the growing period the number of two pieces from each pen randomly selected and slaughtered with cutting the neck vessels and experimental samples from each breast meat samples prepared and sent to the laboratory at temperature -20ºC below zero were stored.

Statistical analysis: The performance and analytical data obtained were analyzed by variance analysis using the procedure described by the SAS version 8.2. The Duncan mean separation test was used to determine significant differences between mean values.

$$y_{ij} = \mu + a_i + \varepsilon_{ij}$$

where;

y_{ij} all dependent variable
μ overall mean
a_i the fixed effect of oil levels (i = 1, 2, 3)
ε_{ij} the random effect of residual

RESULTS AND DISCUSSION

Fatty acids profiles were shown in Table 2. Result show that usage of canola oil could effect of poly unsaturated fatty acid and significantly affected abdominal fat PUFA and from 28.7480% in control group

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Table 1: Percentage composition of experimental diets in four period

	4-8 week			8-12 week			12-16 week			16-20 week		
Ingredients'	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Corn	42.50	38.00	36.00	45.60	43.00	35.00	56.64	48.50	40.00	64.41	58.00	48.00
SBM	34.40	36.00	31.15	28.25	27.30	28.24	26.00	27.00	27.50	21.00	21.00	21.00
Oi	0.00	1.25	2.50	0.00	2.50	5.00	0.00	2.50	5.00	0.00	2.50	5.00
Fish	4.80	3.70	6.60	8.00	8.00	8.00	2.64	1.82	1.50	0.65	0.70	0.67
Starch	3.10	3.22	1.56	7.46	3.32	3.37	6.57	6.51	6.50	7.10	5.56	6.71
Alfalfa	3.47	5.00	6.00	3.00	5.00	6.00	1.50	4.00	6.00	1.00	3.80	6.00
DCP	1.38	1.52	1.11	0.63	0.61	0.62	1.03	1.15	1.18	1.17	1.15	1.15
Met	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Lys	1.50	1.50	1.50	1.50	1.50	1.50	1.40	1.50	1.50	1.50	1.50	1.50
Oyster	1.02	1.02	0.86	0.73	0.67	0.62	0.92	0.87	0.82	0.90	0.81	0.73
wheat bran	2.00	3.00	6.00	2.50	5.00	6.00	1.00	3.00	6.00	0.00	1.70	5.00
Vit supp[1]	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Min supp[2]	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Sand	3.58	3.54	4.47	0.08	0.85	3.40	0.05	0.90	1.75	0.02	1.03	1.99
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated nutrient content												
ME kcal/kg	2755	2755	2755	2850	2850	2850	2945	2945	2945	3040	3040	3040
Crude protein (%)	24.7	24.7	24.7	20.9	20.9	20.9	18.1	18.2	18.1	15.7	15.7	15.7
Calcium (%)	0.95	0.95	0.95	0.81	0.81	0.81	0.71	0.71	0.71	0.62	0.62	0.62
Available P (%)	0.48	0.48	0.48	0.40	0.40	0.40	0.36	0.36	0.36	0.31	0.31	0.31
ME/CP	112	112	112	136	136	136	163	162	163	194	194	194
Ca/P	2	2	2	2	2	2	2	2	2	2	2	2

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, 120,000mg; Zn, 80,000 mg; Fe, 90,000 mg; Cu, 15,000 mg; I, 1,600 mg; Se, 500 mg; Co, 600 mg

Table 2: Least square means for fatty acid profiles of abdominal fat of turkey

Treatments	Control	2.5	5	p-value	SEM
C18:3-3	4.1790 b	7.1479 a	7.3953 a	0.0002	0.2600
C20:5n-3	2.8226 a	2.4456 a	2.0535 a	0.6334	0.5483
C22:5-3	3.2516 c	6.9323 b	8.0224 a	0.0001	0.2636
C22:6-3	2.3414 a	2.5786 a	2.6517 a	0.7924	0.3301
PUFA	28.7480 b	40.790 a	44.5220 a	0.0018	1.7644
MUFA	26.9554 a	24.8982 a	22.2580 b	0.0042	0.5970

reached to 40.790 and 44.5220% in experimental treatment and For mono unsaturated fatty acids with descending rate from 26.9554% in control group reached to 24.8982 and 22.258%, respectively in experimental treatment. N-3 fatty acid help to increase PUFA quality and for this research C18:3 n-3, C20:5 n-3, C22:5n-3 and C22:5 n-3 is important fatty acids and C18:3 n-3 and C22:5 n-3 significantly increased compared with control group and affect PUFA content. One of the ways consumers may reduce their risk of cardiovascular and other disease is by consuming more polyunsaturated fatty acids, particularly n-3 fatty acids (Gebauer *et al*., 2006; Harris *et al*., 2007; Von Schacky and Harris, 2007). The most important n-3 fatty acids in human nutrition are eicosapentaenoic acid (EPA; 20:5n-3) and docosahexaenoic acid (DHA; 22:6n-3), and α-linolenic (LNA; 18:3n-3) in that it serves as a precursor for the synthesis of EPA and DHA (Burdge, 2004; Arterburn *et al*., 2006; Gebauer *et al*., 2006).

CONCLUSION

Result show that application of canola oil in 2.5 and 5% could help to increase abdominal fat PUFA content and that quality.

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