

Transfer of Dietary N-3 Fatty Acids to Liver of Turkeys

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Abstract: The effect of canola oil on liver n-3 fatty acids composition in Iranian native turkey was investigated. Nine male turkey chicks randomly divided into three experimental treatments (Three levels of canola oil; 0, 2.5 and 5 percent) with three replicates were arranged in a completely randomized design. The experimental period lasted 20 week. Experimental diets consisted of: Basal diet with 0, 2.5 and 5 percent of canola oil. Results show that successfully and significantly dietary n-3 fatty acids transfer to liver and turkeys liver enrichment with n-3 fatty acids.

Key words: Canola oil • Iranian native turkey • n-3 fatty acids • Liver

INTRODUCTION

Omega-3 fatty acids are long chain, polyunsaturated fatty acids (PUFA) of plant and marine origin. The potential health benefits of omega-3 fatty acids have been widely reported for several conditions including cardiovascular disease, hypertension, atherosclerosis, brain development, diabetes, cancer, arthritis, inflammatory, autoimmune and neurological disorders [1, 2]. Pioneering studies regarding the effect of omega-3 fatty acids on human health were carried out by Bang *et al.* [3] with Greenland Eskimos. They showed the importance of omega-3 fatty acids in reducing cardiovascular disease. Long chain omega-3 polyunsaturated fatty acids, specifically EPA and DHA have been found to reduce the risk of cardiovascular disease by reducing the total serum cholesterol and serum triglycerides [4]. Because these essential fatty acids cannot be synthesized in the human body, they must be derived from dietary sources. Such as plant or animal origin. Canola one of the rich sources of the omega-3 PUFA alpha-linolenic acid (ALA). The content and composition of fat in meat and giblets are affected by animal feeding, a fact that is exploited in the modification of the composition of the fatty acids in meat and the best results have been obtained in monogastric animals such as pigs and poultry [5]. Liver one of the edible organs of poultry and could application in the human ration. Enrichment of this organ could help to

human health. The objective of this study was to investigate the effect of canola oil on the fatty acids composition of Iranian native turkey liver.

MATERIALS AND METHODS

Nine male native turkey chickens were distributed in a completely randomized design (three level of canola oil 0.0, 2.5, 5.0 percent) with three experimental units each (ten chicks/pen). The experimental diets formulated isonitrogenous 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 liver tissue samples prepared and sent to the laboratory at temperature - 20°C below zero were stored and the composition of fatty acids present in the samples (Table 2) was determined by gas liquid chromatography, according to Folch, *et al.* [6].

Statistical Analysis: The performance and analytical data obtained were analyzed by variance analysis using the procedure described by the SAS version 8.2 [7]. The Duncan mean separation test was used to determine significant differences between mean values.

Table 1: Percentage composition of experimental diets in four period

Ingredients ¹	4-8 week			8 - 12 week			12 - 16 week			16 - 20 week		
	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
Oil	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	2755.00	2755.00	2755.00	2850.00	2850.00	2850.00	2945.00	2945.00	2945.00	3040.00	3040.00	3040.00
Crude protein (%)	24.70	24.70	24.70	20.90	20.90	20.90	18.10	18.20	18.10	15.70	15.70	15.70
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	112.00	112.00	112.00	136.00	136.00	136.00	163.00	162.00	163.00	194.00	194.00	194.00
Ca/P	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

¹Vitamin content of diets provided per kilogram of diet: vitamin A,D, E and K

²Composition 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 n-3 fatty acids of turkey liver

	Percent				SEM
	Control	2.5	5	P value	
C18:3 n-3	4.2234 ^b	7.5523 ^a	7.9896 ^a	0.0008	0.3843
C20:5n-3	2.8420 ^a	2.3210 ^a	2.500 ^a	0.8729	0.7111
C22:5 n-3	3.3204 ^b	7.2176 ^a	8.0682 ^a	0.0004	0.4136
C22:6 n-3	3.0300 ^a	2.6379 ^a	3.4254 ^a	0.4450	0.4089
n3	13.416 ^b	19.728 ^a	21.984 ^a	0.0076	1.2687

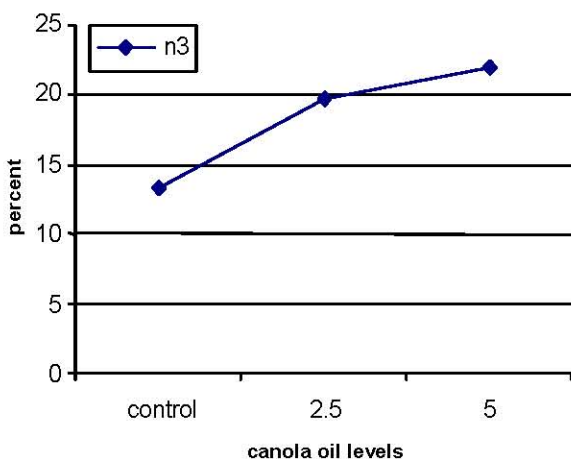


Fig. 1: Least square means for n-3 fatty acids of turkey liver

RESULTS AND DISCUSSION

Results of n-3 fatty acids in the liver of the experimental turkeys are shown in Table 2. Results show that C20:5n-3 C22:6 n-3 fatty acids no change with application canola oil in the native turkey diets and Not much difference with control group, but C18:3 n-3 significantly affect and from 4.2234 percent in control group in two levels of canola oil reached to 7.5523 and 7.9896 percent, respectively. Also, C22:5 n-3 significantly increased and from 3.0300 percent in the control group reached to 7.276 and 8.0682 percent in the experimental treatments. The fatty acids composition of lipids from meat and giblets reflected the fatty acids composition of the diet [8-10]. This information corroborates previous findings [11-13]. The deposition of n-3 fatty acids in

the liver their not difference between level of 2.5 and 5 percent of canola oil. However, in the present study, the increase ($P<0.05$) the content of n-3 fatty acids in the liver and this condition could help to human health.

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