Diet manipulation could influence liver Polyunsaturated and mono unsaturated fatty acids of Azerbaijan native turkeys?

Ramin Salamatdoustnobar , Abolfazl Ghorbani, Kambiz Nazer Adl, Seyaed Saied Ghaem Maghami
Department of Animal Science, Shabestar Branch, Islamic Azad University, Shabestar, Iran
r.salamatdoust@gmail.com

Abstract: An experiment was performed to study canola oil on the Polyunsaturated and mono unsaturated fatty acids of Iranian native turkey liver. 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. Experimental diets consisted of: Basal diet with 0, 2.5 and 5 percent of canola oil. Application of canola oil could decresed mono unsaturated fatty acids and increased Polyunsaturated fatty acids content and usage vegetable oils one of the ways to increased animal tissue quality and this status has direct effects on the human health.
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1. Introduction

The studies show that feeding growing poultry with rich sources of polyunsaturated fatty acids resulted in their subsequent incorporation into carcass lipids. Leskanich and Noble [1997], Wood and Enser [1997], Wenk et al. [2000], and more recently by Gonzales Esquera and Leeson [2001], As could be expected, fatty acid profiles of tissue fat closely reflected those of the dietary fat. As indicated by Leskanich and Noble [1997], marked changes in muscle. The beneficial effects of the n-3 polyunsaturated fatty acids have been demonstrated by numerous reports. Vegetable oils with high levels of n-3 fatty acids could help to enrichment of animal tissues. Some authors (Nuernberg et al, 2005, Wood et al., 2003) revealed the possibility to increase the concentration of beneficial omega 3 fatty acids in animal tissues by using various types of oleaginous sources. The DHA and EPA are synthesized from the n-3 precursor a-linolenic acid (ALA; 18:3), whereas long chain n-6 PUFA such as arachidonic acid (AA) are synthesized from the precursor linoleic acid (LA; 18:2). The ALA and LA are essential to the human diet because neither is synthesized endogenously by humans, and the n-3/n-6 families cannot be inter converted. In theory, the ability to convert ALA to EPA and DHA means that humans have no need for an exogenous supply of these fatty acids (Budowski, 1988).. Gerster, 1998) Sanders & Roshanai, 1983). The objective of this experiment was to evaluated canola oil effect on the liver poly and mono unsaturated fatty acids of Iranian native turkey liver.

2. 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 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 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 (1957)[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.

3. Results and discussion

1. Result of Least square means for PUFA and MUFA fatty acids profile of turkey liver are shown in table2. Mono unsaturated fatty acids include C16:1 n7 and C18:1 t11 significantly affected canola oil levels on the diets. C16:1 n7 significantly from 7.7331 percent in control group reached to 5.5392 and 4.8216 percent in experimental treatments and between to levels of oils were not significantly difference. C18:a t11 fatty acid with descending rate significantly decrease in treatment with 2.5 and 5 percent canola oil and from 1.6506 percent in control group reached to 0.1989 and 0.6826 percent in experimental treatment, respectively. Other MUFA fatty acids include C18:1 n-9 and C20:1 n-9 was not statistical difference between experimental treatments.

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

1Vitamin 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 PUFA and MUFA fatty acids profile of turkey liver

	Canola oil levels				
	control	2.5	5	P value	SEM
C16:1 n7	7.7331 [a]	5.5392 [b]	4.8216 [b]	0.0084	0.4426
C18:1 n9	15.8208 [a]	16.8833 [a]	14.9218 [a]	0.1328	0.5792
C18:1 t11	1.6506 [a]	0.1989 [b]	0.6826 [b]	0.0174	0.2528
C20:1n-9	1.8905 [a]	1.7975 [a]	2.1554 [a]	0.2368	0.4801
C18:2	2.7771 [a]	3.1978 [a]	3.0373 [a]	0.5536	0.2629
C18:2 Trans t12	1.0081 [a]	1.4547 [a]	0.5438 [a]	0.4942	0.5116
C18:2n6Cis	4.2921 [c]	8.5931 [b]	9.7358 [a]	0.0001	0.1855
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]	2.5000 [a]	0.8729	0.7111
C22: 4n-6	7.7425 [a]	8.0057 [b]	9.0928 [a]	0.0290	0.2756
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
MUFA	26.095 [a]	24.419 [ab]	22.581 [b]	0.0446	0.7532
PUFA	29.236 [b]	40.980 [a]	44.393 [a]	0.0016	1.6733

A number of studies have been carried out in the past to 45 modify the fatty acid profile of meat products especially by addition of vegetable oil (Bloukas et al., 1997; Muguerza et al., 2002 Jimenez-Colmenero et al., 2010; Lopez-Lopez et al., 2009). These experiment results agree with other researcher report. About PUFA fatty acids results show that C18:2n6Cis fatty acid from control group with 4.2921 significantly reached to 8.5931 and 9.7358 percent in experimental treatments, and for C18:3 n-3 according to result were shown canola oil could significantly change this fatty acid and from 4.2234 percent increased and reached to 7.5523 and 7.9896 percent in experimental treatment, respectively. C22: 4n-6 fatty acid from 7.7425 in control group significantly reached to 8.0057 and 9.0928 percent, and C22: 5n-6 fatty acid with significant rate from 3.3204 percent reached to 7.2176 and 8.0682 percent. Total of MUFA significantly influence of canola oil and with descending rate significantly decreased and respectively reached to 24.419 and 22.581 percent for experimental treatments. PUFA fatty acids its beneficial fatty acids and increase that's its good for improved animal products quality, application canola oil could significantly increased PUFA and from 29.236 percent reached to 40.980 and 44.393 percent. Some authors (Nuernberg et al, 2005, Wood et al., 2003) revealed the possibility to increase the concentration of beneficial omega 3 fatty acids in animal tissues by using various types of oleaginous sources. The addition of carefully selected oils can reduce the saturated fatty acid content and increase the PUFA content (omega-3) (Jimenez-Colmenero, 2007). A variety of plant derived oils such as olive, flaxseed, canola, etc. and marine derived fish oil and algal oils have been used to modify the fatty acid profile of animal tissues (Jimenez-Colmenero, 2007). Application of canola oil could improve MUFA and PUFA content and usage vegetable oils one of the ways to increased animal tissue quality and this status has direct effects on the human health.

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