

## Enrichment with long chain omega-3 fatty acids and sensory evaluation of chicken meat

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**Introduction** N-3 fatty acids are essential for normal growth and development, and may play an important role in prevention of coronary artery disease, hypertension, diabetes, arthritis, other inflammatory and autoimmune disorders and cancer in humans (Simopoulos, 1999). Fatty acid profiles of broiler meat may be modified by adding fish oils to the diet (Lopez-Ferrer *et al.*, 2001). When meat is enriched with PUFA, particularly n-3 long-chain fatty acids (C<sub>≥</sub>20), all sources of added vegetable oils seem to be less effective than marine oils (Bou. R *et al.*, 2004). The purpose of this experiment was to study the effect of dietary fish oil on fatty acid composition of thigh and breast meat in broiler chickens.

**Materials and methods** Four hundred and fifty d-old Ross 308 male, broiler chickens were allocated to 6 dietary treatment with 5 replicates of 15 birds each. The birds were reared in a controlled environment house and had *ad libitum* access to water and feed. All dietary nutrients were provided as to meet AVIAGEN recommendations. Khazar Kilka fish oil was added at the levels of 0, 10, 20, 30, 40 and 50 g/kg in diets, fed from 28 to 42d of age. Performance criteria were measured during the experimental period. One bird with an average live body weight of each replicate group was selected and slaughtered on day 42 d The left thigh and left side of the breast were excised and stored at -20 C for later analysis. Samples (including skin) were analyzed for n-3 fatty acids with GC and sensory evaluation after each sample was individually cooked in boiling water. Data were analysed by using GLM procedure of SAS (9.1)

**Results** Weight gain and Feed Conversion Ratios were similar (P>0.05 ) for all treatments (table1). The Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA) contents of thigh or breast tissues were increased significantly (P<0.05) as the level of dietary fish oil increased. Effects were not significant for LA(linoleic acid) and ALA(alpha linolenic acid). Sensory evaluation showed that panellists did not identify the fishy smell of cooked thigh or breast meat of birds fed diets with 0, 10 or 20 g/kg fish oil. The concentration of DHA in breast and thigh meat increased from 0.046 (mg/g) and 0.086 (mg/g) to 0.166 (mg/g) and 0.27 (mg/g), respectively, when dietary fish oil increased from 0 to 20 g/kg,. Significant linear relationships were found between the levels of fish oil and EPA in the breast and thigh (R<sup>2</sup> = 0.59 ; R<sup>2</sup>= 0.71 respectively ) and between the fish oil and DHA in the breast and thigh (R<sup>2</sup> = 0.71 ; R<sup>2</sup> = 0.72, respectively ).

**Table 1** Broiler chickens performance and concentration of some n-3 FAs in breast and thigh meat (mg/g in meat) of birds given diets including fish oil

Treatments	WG (g/b/d)	FCR	Thigh				Breast				Scores <sup>1</sup>	
			C18:2	C18:3	C20:5	C22:6	C18:2	C18:3	C20:5	C22:6	Thigh	Breast
control	69.8	2.24	5.4	0.35	0.028 <sup>b</sup>	0.086 <sup>c</sup>	0.54 <sup>b</sup>	0.02b	0.014 <sup>b</sup>	0.046 <sup>c</sup>	1.10	1.12
1% fish oil	71.4	2.27	6.2	0.13	0.051 <sup>b</sup>	0.16 <sup>bc</sup>	0.87 <sup>ab</sup>	0.04 <sup>ab</sup>	0.042 <sup>b</sup>	0.145 <sup>bc</sup>	1.27	1.17
2% fish oil	69.2	2.48	6.1	0.42	0.086 <sup>ab</sup>	0.27 <sup>bc</sup>	0.99 <sup>ab</sup>	0.10 <sup>a</sup>	0.04 <sup>b</sup>	0.166 <sup>bc</sup>	1.25	1.25
3% fish oil	72.1	2.29	4.6	0.32	0.16 <sup>ab</sup>	0.38 <sup>ab</sup>	0.67 <sup>ab</sup>	0.03 <sup>ab</sup>	0.04 <sup>b</sup>	0.240 <sup>ab</sup>	2.32	2.25
4% fish oil	67.6	2.53	4.2	0.43	0.23 <sup>a</sup>	0.53 <sup>a</sup>	0.99 <sup>ab</sup>	0.07 <sup>ab</sup>	0.09 <sup>a</sup>	0.340 <sup>a</sup>	3.25	3.87
5% fish oil	68.0	2.44	3.2	0.30	0.16 <sup>ab</sup>	0.58 <sup>a</sup>	1.10 <sup>a</sup>	0.06 <sup>ab</sup>	0.08 <sup>a</sup>	0.290 <sup>a</sup>	4.02	4.25
SEM	1.78	0.04	0.09	0.11	0.05	0.08	0.16	0.04	0.01	0.04		
P value	NS	NS	NS	NS	0.003	0.003	NS	NS	0.006	0.001		

<sup>abc</sup> Values in column with no common superscripts differs significantly (P<0.05)

<sup>1</sup> Flavour scores using a 5 point scale: 5=very poor,4=poor, 3=indifferent, 2=acceptable, 1=typical chicken flavour

**Conclusion** The levels of long chain fatty acids (EPA and DHA) were linearly increased in the chicken meat as the levels of dietary Khazar Kilka fish oil increased from 0 to 5%. The panellists identified the fishy smell of the meat when more than 20 g/kg fish oil was included in the diet.

**Acknowledgment** The financial support of Zarbal Co research station, Amol, Iran, is greatly appreciated.

### References

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