

## NUTRITIONAL PROFILE OF STURGEON MEAT

MANFREDINI M., BADIANI A., GATTA P.P., NANNI N., STIPA S.

ISTITUTO DI APPROVVIGIONAMENTI ANNONARI - FACOLTA' DI MEDICINA VETERINARIA - UNIVERSITA' DI BOLOGNA (ITALY)

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**Introduction** - Of the Countries of the European Union that farm sturgeon, Italy is the largest producer (400 t in 1992). Sturgeon culture within Italy aims at a market which much appreciates the high quality flavour of the meat.

**Objective** - Given the limited information available regarding the nutritional properties of this product, the aim of this study was to analyse the chemical composition of sturgeon meat to assess its nutritional value.

**Materials and Methods** - A total of thirty sturgeon were used for the trial of which 10 were white sturgeon (*Acipenser transmontanus*), 10 Italian sturgeon (*Acipenser naccarii*) and 10 Siberian sturgeon (*Acipenser baeri*). The live weight of the subjects ranged from 3.35 to 5.70 kg and the age from 42 to 54 months. All the fish were caught from one intensive farm in Northern Italy. The rearing and feeding conditions were identical for the three species. The feed administered was food pellets for sturgeon. In accordance with AOAC procedure, three 6 cm long slices were removed from each fish and muscle tissue was isolated by removing skin and bony.

**Results** - The results are shown in the following tables.

**Conclusions** - On the basis of the present results, the most important features of cultured sturgeon were a medium fat and cholesterol content, fairly high level of magnesium, zinc and niacin, a high proportion of soluble collagen and a moderate amount of uricogenic purine bases. The fatty acid composition, proved to be interesting for the rather high n-3 PUFA content and n-3/n-6 ratio.

Cultured fish with a medium fat content, like sturgeon, could probably be the more natural way to steadily provide health-conscious consumers with an appreciable amount of n-3 PUFAs, once fish fat has been conveniently tailored through suitable feeding choices.

TABLE 1  
PROXIMATE COMPOSITION, CHOLESTEROL CONTENT AND ENERGY VALUE OF EDIBLE PORTION OF CULTURED STURGEON (per 100 g)

Trait	mean ± s.e.	range
Moisture, g	72.49 ± 0.54	65.93 - 77.59
Protein, g	19.23 ± 0.17	17.60 - 21.01
Lipid, g	7.63 ± 0.58	2.66 - 15.31
Ash, g	1.09 ± 0.02	0.80 - 1.21
Cholesterol, mg	66 ± 1	52 - 77
Energy value, kcal	146 ± 5	105 - 208
ditto, kJ	609 ± 20	444 - 866

TABLE 2  
SELECTED MINERAL CONTENT OF EDIBLE PORTION OF CULTURED STURGEON (per 100 g)

Trait	mean ± s.e.	range
Sodium	44.4 ± 1.4	39.9 - 52.0
Potassium	330 ± 9	298 - 383
Magnesium	46.8 ± 5.5	29.1 - 68.8
Calcium	18.1 ± 1.0	15.2 - 24.4
Phosphorus	239 ± 5	216 - 268
Iron	0.53 ± 0.03	0.31 - 0.71
Zinc	0.84 ± 0.03	0.73 - 0.98

TABLE 3  
SELECTED VITAMIN CONTENT OF EDIBLE PORTION OF CULTURED STURGEON (per 100 g)

Trait	mean ± s.e.	range
Niacin, mg	5.62 ± 0.31	4.70 - 6.60
Pantothenic acid, mg	0.76 ± 0.08	0.59 - 0.92
Piridoxine (B <sub>6</sub> ), mg	0.44 ± 0.03	0.38 - 0.55
Vitamin B <sub>12</sub> , µg	1.27 ± 0.08	1.13 - 1.50

TABLE 4  
HYDROXYPROLINE, COLLAGEN AND PURINE CONTENT OF EDIBLE PORTION OF CULTURED STURGEON (per 100 g, unless otherwise stated)

Trait	mean ± s.e.	range
Hydroxyproline, mg	81.4 ± 4.07	66.0 - 92.4
Total collagen (TC), g	1.22 ± 0.06	0.99 - 1.39
Soluble collagen, %TC	68.15 ± 1.36	61.95 - 71.25
Purine, mg		
- adenine	15.47 ± 0.42	13.76 - 17.16
- guanine	9.94 ± 0.47	8.62 - 12.38
- xanthine <sup>b</sup>	-----	-----
- hypoxanthine	92.71 ± 5.14	75.02 - 108.97

<sup>a</sup> Hydroxyproline/collagen conversion factor = 15 (derived from Sato *et al.*, 1989).

TABLE 5  
FATTY ACID PROFILE OF EDIBLE PORTION OF CULTURED STURGEON

Trait <sup>a</sup>	mg/100g		% total FAME <sup>b</sup>	
	mean	± s.e.	mean	± s.e.
SFA	14:0	238 ± 21	3.61 ± 0.10	
	15:0	23 ± 2	0.35 ± 0.01	
	16:0	1360 ± 140	19.74 ± 0.27	
	18:0	125 ± 8	2.05 ± 0.11	
	19:0	17 ± 2	0.25 ± 0.01	
MUFA	14:1	11 ± 1	0.16 ± 0.01	
	16:1n-7	511 ± 63	7.07 ± 0.23	
	18:1n-9	1779 ± 188	26.08 ± 0.58	
	18:1n-7	166 ± 15	2.50 ± 0.06	
	20:1n-11	102 ± 8	1.58 ± 0.05	
	20:1n-9	315 ± 26	4.91 ± 0.14	
	22:1n-11	195 ± 17	3.12 ± 0.13	
	22:1n-9	25 ± 2	0.39 ± 0.02	
	24:1	14 ± 1	0.23 ± 0.01	
PUFA	18:2n-6 (LA)	205 ± 19	3.11 ± 0.11	
	18:3n-6	10 ± 1	0.15 ± 0.01	
	18:3n-3 (ALA)	46 ± 4	0.69 ± 0.02	
	18:4n-3	75 ± 7	1.15 ± 0.04	
	20:2n-6	16 ± 1	0.25 ± 0.01	
	20:3n-6	8 ± 1	0.12 ± 0.01	
	20:4n-6 (AA)	47 ± 3	0.76 ± 0.03	
	20:5n-3 (EPA)	362 ± 28	5.63 ± 0.18	
	21:5n-3	17 ± 1	0.26 ± 0.01	
	22:5n-3	76 ± 6	1.18 ± 0.04	
	22:6n-3 (DHA)	601 ± 52	9.18 ± 0.17	
Unknown	Sum	101 ± 14	1.38 ± 0.07	

<sup>a</sup> SFA= saturated fatty acid; MUFA= monounsaturated fatty acid; PUFA= polyunsaturated fatty acid; LA= linoleic acid; ALA=α-linolenic acid; AA= arachidonic acid; EPA= eicosapentaenoic acid; DHA= docosahexaenoic acid.  
<sup>b</sup> FAME= Fatty Acid Methyl Esters.

TABLE 6  
AMINO ACID PROFILE OF EDIBLE PORTION OF CULTURED STURGEON

Trait	g/100g		g/16g total nitrogen (TN)	
	mean	± s.e.	range	mean ± s.e.
<b>Essential (E)</b>				
Histidine	0.82 ± 0.06		0.62 - 0.97	4.27 ± 0.31
Isoleucine	0.92 ± 0.03		0.83 - 1.06	4.76 ± 0.07
Leucine	1.46 ± 0.05		1.34 - 1.68	7.61 ± 0.09
Lysine	1.75 ± 0.06		1.58 - 1.96	9.12 ± 0.10
Methionine	0.56 ± 0.02		0.51 - 0.65	2.90 ± 0.04
Cystine	0.19 ± 0.01		0.16 - 0.23	1.00 ± 0.03
Phenylalanine	0.79 ± 0.03		0.69 - 0.91	4.10 ± 0.07
Threonine	0.83 ± 0.02		0.74 - 0.89	4.29 ± 0.05
Tryptophan	0.14 ± 0.01		0.12 - 0.16	0.71 ± 0.05
Tyrosine	0.65 ± 0.02		0.59 - 0.76	3.39 ± 0.06
Valine	0.96 ± 0.04		0.86 - 1.13	5.00 ± 0.09
<b>Nonessential (NE)</b>				
Alanine	1.10 ± 0.03		1.02 - 1.19	5.73 ± 0.04
Arginine	1.16 ± 0.03		1.08 - 1.28	6.05 ± 0.02
Aspartic acid	1.92 ± 0.06		1.75 - 2.15	9.98 ± 0.07
Glutamic acid	2.78 ± 0.07		2.56 - 3.06	14.45 ± 0.11
Glycine	1.03 ± 0.03		0.97 - 1.17	5.36 ± 0.14
Proline	0.77 ± 0.03		0.67 - 0.83	4.01 ± 0.07
Serine	0.75 ± 0.03		0.65 - 0.83	3.87 ± 0.09
Ammonia	0.30 ± 0.01		0.27 - 0.35	1.57 ± 0.04
<b>Profile variables</b>				
E/NE		0.95		
E/TN		2.95		
Chemical score		73.46		
DC-PER <sup>a</sup>		2.70		

<sup>a</sup> Digestibility Calculating-Protein Efficiency Ratio (Satterlee *et al.*, 1982).