Swiss salmon roe: from by-product to a nutritional fatty acid product: Figures, Tables and References

Table 1. Methods and measuring techniques used in nutritional values analysis of salmon roe.
Methods and measuring techniques used in each parameter in the nutritional values analysis of salmon roe.

Parameter	Method	Measuring technique
Water content	SLMB	Gravimetric
Minerals (ash)	SLMB	Gravimetric
Total protein Nx6.25	UFAG	DUMAS
Total fat	LFGB	Gravimetric (acid digestion)
Carbohydrates	SLMB, UFAG	Calculated, HPCL-RI
Sugars	UFAG	HCPL-RI
Fatty acid content	LFGB	GC-FID calculated
Sodium	UFAG	ICP-OES
Sodium chloride	UFAG	Calculated from sodium
Energy value	SLMB	Calculated

Figure 2. Salmon roe supply.
2 kg of salmon roe supplied by Swiss Alpine Fish AG on 19. April 2021, in a container with capacity of 5 liters.

Figure 1. Salmon roe extraction.
This picture shows how the eggs are placed before ex- traction and separation from the fish.

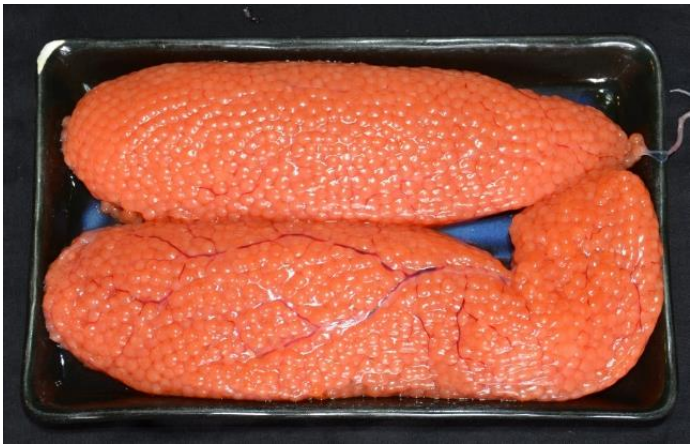

Figure 3. Two yolk sacs full of salmon roe.
After the separation from the fish and other organs, the roe is cleaned under cold water and dried with kitchen paper.

Figure 4. Salmon roe after marinating in salt.
Roe marinated in salt for about 8 hours in the

Figure 5. Dough before drying in the oven.
Dough rolled out and cut into round shapes of about 3 cm in diameter, placed on a baking tray before drying.

Figure 6. Final product.
Finished processing and drying in a ventilated oven at temperatures below 50°C for a duration of approximately 11 hours.

Table 2. Methods and measuring techniques used in nutritional values analysis of the product.
Methods and measuring techniques used in each parameter in the nutritional values analysis of the product. The table is like Table 1, but with the addiction of the fibre parameter and method and measuring techniques to analyse it.

Parameter	Method	Measuring technique
Water content	SLMB	Gravimetric
Minerals (ash)	SLMB	Gravimetric
Total protein Nx6.25	UFAG	DUMAS
Total fat	LFGB	Gravimetric (acid digestion)
Fibre (dietary fibre)	AOAC 985.29	Enzymatic, gravimetric
Carbohydrates	SLMB, UFAG	Calculated, HPCL-RI
Sugars	UFAG	HCPL-RI
Fatty acid content	LFGB	GC-FID calculated
Sodium	UFAG	ICP-OES
Sodium chloride	UFAG	Calculated from sodium
Energy value	SLMB	Calculated

Table 3. General nutritional values of salmon roe and product.
The nutrients contents in salmon roe and product are given in g/100 g of salmon roe or product.

Nutrients	Salmon roe content in g/100 g	Product content in g/100
Water content	61.4	13.4
Minerals (ash)	1.8	1.8
Protein	26.9	15.8
Fats	8.0	3.7
Carbohydrates	1.9	61.8
Fibre (dietary fibre)	0	3.5

Table 4. Energy values in salmon roe and product.
Energy values are given in kilocalorie (kcal) and kilojoule (kJ) per 100 g of salmon roe or product.

Energy value	In 100 g of salmon roe	In 100 g of product
In kcal	187	351
In kJ	786	1’484

Table 5. Fatty acids values in salmon roe and product.
Contents of fatty acids in salmon roe and product are given in g/100 g of salmon roe or product.

Fatty acids	Salmon roe content in g/100 g	Product content in g/100 g
Saturated fatty acids	1.64	0.832
Monounsaturated FS	2.71	1.11
Polyunsaturated FS	3.17	1.74
Omega-3 fatty acids	2.16	0.618
Omega-6 fatty acids	1.01	1.12

Table 6. Saturated fatty acids value in salmon roe and product.
Saturated fatty acids contents in salmon roe and product are given in g/100 g of salmon roe or product. The 0.0001 values written in grey represent substitute values for the values below the limit of quantification of the analysis.

Saturated fatty acids	Lipid numbers	Salmon roe content in g/100 g	Salmon roe content in g/100 g
Lauric acid	C12:0	0.0001	0.002
Myristic acid	C14:0	0.12	0.042
Palmitic acid	C16:0	1.02	0.625
Margaric acid	C17	0.0001	0.009
Stearic acid	C18:0	0.50	0.141
Arachidic acid	C20	0.0001	0.004
Behenic acid	C22:0	0.0001	0.004
Lignoceric acid	C24:0	0.0001	0.005

Table 7. Monounsaturated fatty acids values in salmon roe and product.
Monounsaturated fatty acids contents are given in g/100 g of salmon roe or product. The 0.0001 values written in grey represent substitute values for the values below the limit of quantification of the analysis.

Monounsaturated fatty acids (MUFA)	Lipid numbers	Salmon roe content in g/100 g	Salmon roe content in g/100 g
Palmitoleic acid	C16:1	0.17	0.080
Oleic acid	C18:1	2.38	0.995
Gadoleic acid	C20:1	0.16	0.053
Erucic acid	C22:1	0.0001	0.011
Selacholeic acid	C24:1	0.0001	0.011

Table 8. Polyunsaturated fatty acids value in salmon roe and product.
The contents are given in g/100 g. The 0.0001 values written in grey represent substitute values for the values below the limit of quantification of the analysis.

Polyunsaturated fatty acids (PUFA)	Lipid numbers	Salmon roe content in g/100 g	Salmon roe content in g/100 g
Linoleic acid	C18:2	0.74	1.05
Alpha-linolenic acid	C18:3	0.19	0.123
Gamma-linolenic acid	C18:3	0.0001	0.002
Parinaric acid	C18:4	0.0001	0.009
Eicosadienoic acid	C20:2	0.14	0.042
Eicosatrienoic acid	C20:3	0.078	0.029
Arachidonic acid	C20:4	0.13	0.026
Eicosapentaenoic acid	C20:5	0.40	0.100
Docosatetraenoic acid	C22:4	0.0001	0.004
Docosapentaenoic acid	C22:5	0.19	0.059
Docosahexaenoic acid	C22:6	1.30	0.299

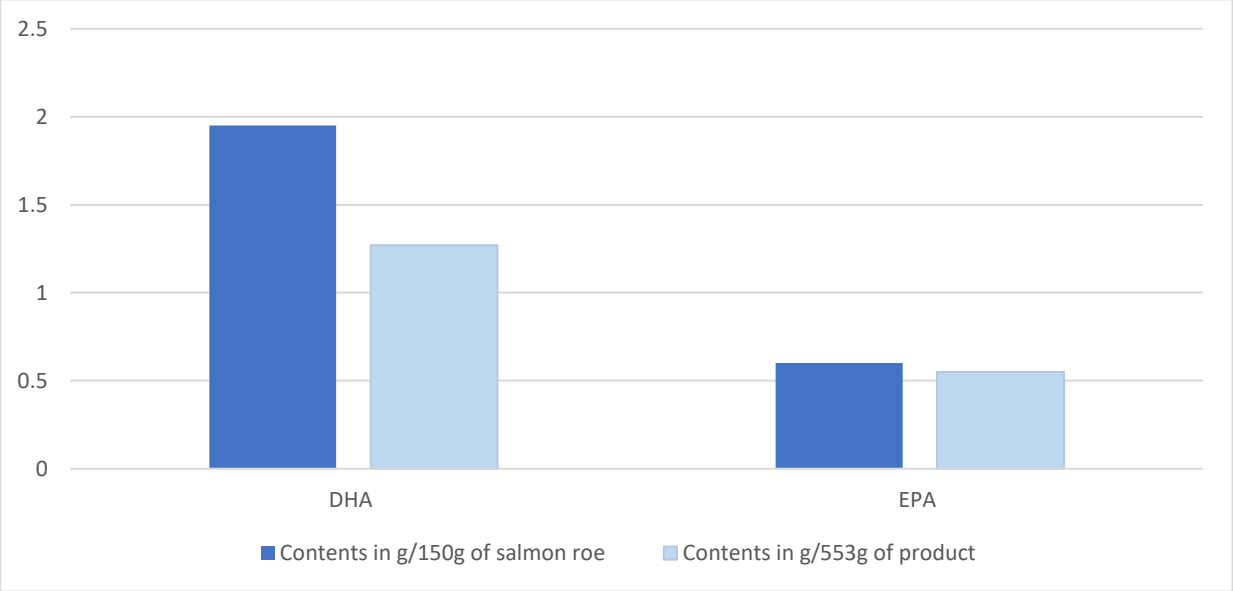

Figure 7. Comparation of the content of EPA and DHA in 150 g of salmon roe and 553 g of product.
Abbreviations: DHA, docosahexaenoic acid; EPA, eicosapentanoic acid. The values are given in g/150 g of salmon roe in g/553 g of product. This figure clearly shows the difference in values of EPA, DHA in the salmon roe and the product. It shows the oxidation rate of EPA and DHA during product processing.

Table 9. Maltose and D-glucose value in salmon roe and product.
The contents in salmon roe and product are given in g/100 g of salmon roe or product.

Carbohydrates	Salmon roe content in g/100 g	Salmon roe content in g/100 g
D-glucose	< 0.10	0.14
Maltose	< 0.10	1.34

Table 10. Salt value in salmon roe and product.
Salmon roe and product content of salt is given in g/100 g.

Salt	Salmon roe content in g/100 g	Product content in g/100 g
Sodium chloride	0.2	1.9

Table 11. Sodium value in salmon roe and product.
Sodium content is given in mg/ 100g.

Element	Salmon roe content in mg/100 g	Product content in mg/100 g
Sodium	74	774

Table 12. Shelf life of the product
The storage method and location are shown with their respective temperatures in °C and humidity in %. The last column shows the respective shelf life in days of the product in the respective methods and places.

Storage method and place	Temperature in °C	Humidity in %	Shelf life in day
Storage in a cellar without a container	9-10	60-65	8
Storage in a cellar in a container	9-10	60-65	17
Storage in a living room without a container	21-24	30-40	33
Storage in a living room in a container	21-24	30-40	46
Storage in a living room in a vacuum bag	21-24	30-40	62

Table 13. Nutritional values label
This table shows the nutritional value label for the product. The %GDA is the reference assumption of the average adult (8400 kJ/ 2000 kcal).

Nutritional values				
Per	**100 g**	**%GDA per 100 g**	**1 cracker (typically 5 g)**	**%GDA per 5 g**
Energy	1484 kJ (351 kcal)	18	74.2 kJ (7.02 kcal)	0.4
Carbohydrates	61.8 g	24	3.09 g	1.2
of which sugars	1.48 g	2	0.074 g	0.1
Protein	15.8 g	32	0.79 g	1.6
Fibre (dietary fibre)	3.5 g	18	0.175 g	0.9
Salt	1.9 g	32	0.095 g	1.6
Fat	3.7 g	5	0.185 g	0.3
of which saturated fatty acids	0.832 g	4	0.0416 g	0.208
monounsaturated fatty acids	1.11 g		0.0555 g	
polyunsaturated fatty acids	1.74 g		0.087 g	
Polyunsaturated fatty acids				
Omega-3 fatty acids	618 mg	20	30.9 mg	1
of which alpha linoleic acid (ALA)	123 mg	41	6.15 mg	2
Eicosapentaenoic acid (EPA)	100 mg	33	5 mg	2
Docosahexaenoic acid (DHA)	299 mg	99.6	14.95 mg	5
Omega-6 fatty acids	1120 mg		56 mg	
Mineral:				
Sodium	774 mg		38.7 mg	

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