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Chemical and fatty acids composition of fish roes

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INTRODUCTION

The global crisis of wild caviar production, due to the block of catch quotas granted by the CITES following the steady decline of world sturgeon populations, and the limited production of caviar from aquaculture, that has not made up for the global demand, has allowed the creation of a market of cheaper caviar substitutes. Various fish species are used for the production of caviar substitutes, with different nutritional properties. The aim of present study is to investigate the chemical composition and fatty acid profile of fish roes coming from seven different species, collected in the Italian market.

SAMPLING

Pike

Cod

Alaska pollock

Trout

Lumpfish

Capelin

Salmon

MATERIALS AND METHODS

- Moisture, protein, ash and salt content were determined by AOAC methods
- Lipids were extracted with a chloroform-methanol mixture
- Fatty acids were analysed by GC-FID
- Principal component analysis (PCA) were applied to data using The Unscrumbler 10.4 software (Camo, Norway)

RESULTS

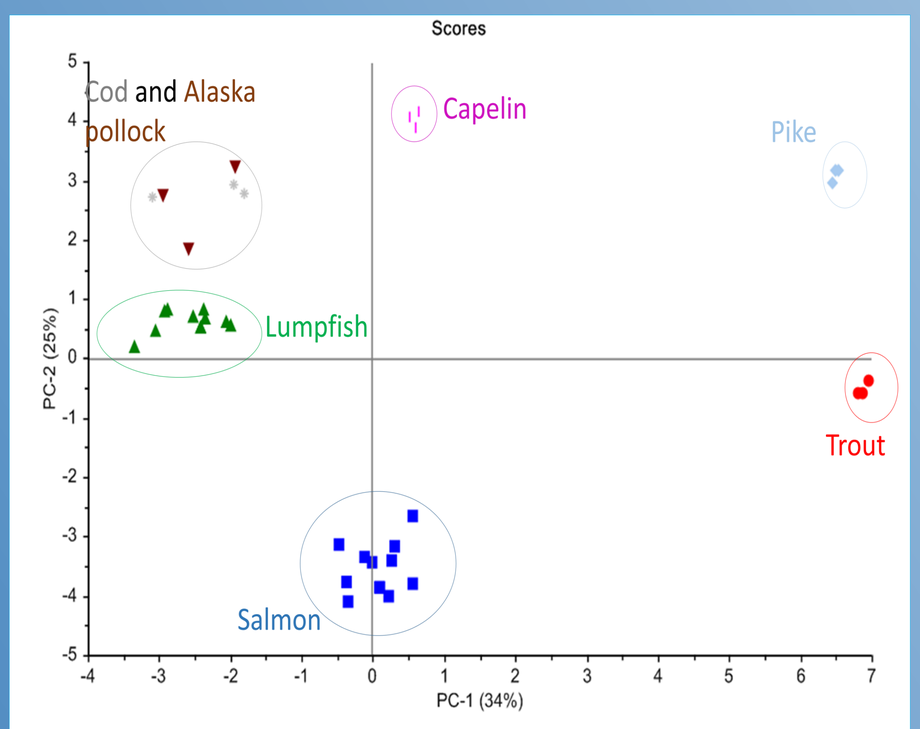
Salmon eggs were the biggest while the smallest resulted the cod and Alaska pollock eggs (Table 1). Generally, eggs of greater size showed an higher protein and lipid content. Protein ranged from the value of 29.6% found in salmon to the value of 8.1% of capelin. Salmon, trout and pike eggs presented the highest lipid content while Alaska pollock eggs were the leanest. Concerning fatty acids (Figure 1) roes were well separated by PCA according to their species, except for cod and Alaska pollock roes which presented a similar fatty acid profile. All species presented a clear prevalence of n-3 PUFAs, particularly eicosapentaenoic acid and docosahexaenoic acid.

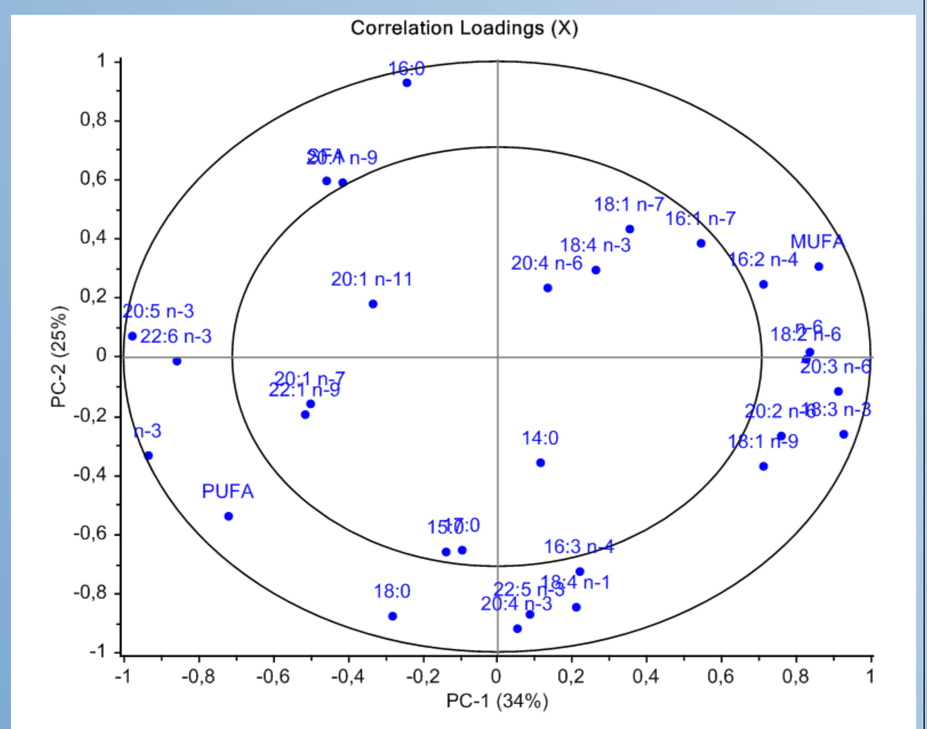
The n-6 PUFAs resulted higher in trout and pike with some differences. Trout roes presented high levels of α-linoleic acid while pike roes n-6 PUFAs were constituted both by α-linoleic and arachidonic acid, present at similar concentrations. Trout, the only farmed species, and Pike, the only freshwater species, presented the highest concentration of oleic acid.

Table 1. Egg weight (mg) and proximate composition (g/100g) of fish roes

	Weight (mg)	Moisture	Protein	Lipid	Ash	NaCl
Salmon	217.3±31.3	53.5±1.7	29.6±0.8	12.8±0.8	4.2±0.8	2.7±0.6
Trout	54.7±7.3	59.2±0.0	23.8±0.1	12.5±0.1	4.6±0.1	2.3±0.1
Lumpfish	6.0±1.1	79.7±0.9	10.8±0.4	4.3±0.6	5.2±0.9	2.7±0.6
Pike	4.7±0.5	64.0±0.8	19.4±1.1	12.7±0.6	3.9±0.0	3.3±0.0
Capelin	0.7±0.1	81.7±0.8	8.1±0.6	4.5±0.2	5.7±0.0	2.5±0.3
Cod	0.2±0.0	71.6±0.5	19.6±0.3	3.2±0.2	5.5±0.1	3.1±0.1
Alaskan pollock	0.2±0.0	73.5±0.4	19.2±0.5	2.8±0.1	4.4±0.1	2.8±0.0

Figure 1. PCA scores and loadings of fatty acid analysis of fish roes





CONCLUSION

This study contributes to the chemical characterization of caviar substitute present on the Italian market. Salmon eggs showed a chemical composition that was more similar to caviar, according to our previous results obtained from caviar samples coming from four different farmed sturgeon species. Regarding fatty acid profile, fish eggs presented a valuable content of essential fatty acids of the omega-3 series, which were higher if compared to the more expensive caviar.