Chemical composition of caviar from farmed sturgeon: comparison between four different species

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Introduction - Caviar is defined as "the product made from fish eggs of the *Acipenseridae* family by treating with food grade salt" (Codex Alimentarius). . In recent years the supplies of wild caviar have declined dramatically and have been replaced by aquaculture products. In this study the proximate and fatty acid (FA) composition of 23 caviar samples of four sturgeon species (*A. baerii*, *A. gueldenstaedtii*, *A. naccari*, *A. trasmontanus*) were measured and compared with wild caviar data available in literature.
Materials and methods - Moisture, protein and ash content were determined by standard AOAC methods (1996), lipid by chloroform/methanol extraction according to Folch *et al*. (1957). FA methyl esters were prepared as described by Christie (1982) and analysed by capillary gas-chromatography. Statistical analysis were performed by SPSS 22 statistical package.
Results and discussion - Except the protein content (23.9-25.3%), proximate composition presented significant differences among species. The most notable difference was the highest lipid content in caviar of *A. trasmontanus* (18%) and *A. gueldenstaedtii* (16.9%) which showed also the lowest level of moisture (53.9% both). Fluctuations in FA profiles were also observed in the interspecific comparison. Palmitic acid was the dominant saturated FA in all samples and its content was significantly higher in *A. naccari* (19.1% of total FAs). Amongst the monounsaturated FAs, the most abundant was oleic acid, which was in absolute the major FA of all samples (25.8-32%). Regarding to *n*-6 polyunsaturated FAs, this study revealed a predominance of linoleic acid (LA; 9.3-14%), followed by arachidonic acid (ARA; 1.8-2.4%). LA and ARA proportions were significantly lower in caviar of *A. naccarii* and *A. gueldenstaedtii*, respectively. All species showed high content of *n*-3 polyunsaturated FAs, with docosahexaenoic acid being the dominant (DHA; 12.1-14%), followed by eicosapentaenoic acid (EPA; 4.4-6.3%).
In literature it is well documented that FA composition of caviar is greatly affected by diet composition. It was observed that LA concentration was higher in farmed caviar than in wild ones whereas the opposite trend was found relative to ARA content. High level of LA in farmed caviar could be attributed to the use of commercial feed containing vegetable oils and meals while the marine food chain is described to contain significant quantities of ARA. In contrast, EPA and DHA content in farmed caviar mirrored that of wild sturgeon. Therefore, it would appear there was a selective accumulation of these FAs irrespective of the dietary level.
Conclusion - This study contributes to the chemical characterization of farmed caviar. Although it is well documented that diet composition can modify aquaculture products, it appears that farmed caviar maintains the nutritional quality of wild ones. In our study caviar showsd similar amount of long-chain *n*-3 polyunsatured FAs to those reported in literature for wild caviar and these FAs are well known to have beneficial effects on human health. This leads us to assert that farmed caviar represent an effective alternative to wild products maintaining a good nutritional quality.

Bibliography

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