EFFECTS OF DRYING PROCESS ON LIPID QUALITY OF SILVERSIDE (FISH) *ATHERINA LAGUNAE*

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Abstract
Changes in lipid quality of silverside during solar and hot air drying process were investigated. Total fatty acid content in silverside was 5.42 g/100g fresh sample. N-3 and n-6 polyunsaturated fatty acids levels were 0.59 and 0.62 g/100g fresh silverside respectively. Therefore, all fatty acid groups increased significantly ($p<0.05$) within processing with higher levels in experimental drying process. After hot air and solar drying treatments, PV and TBARS of the total lipids increased significantly ($p <0.05$) to reach 2.58 and 3.41 meq active O_2/kg oil and 0.87 and 1.27 mg MA/kg oil, respectively.

Keywords: Fishes, Chemical Analysis

Introduction
Lipids of marine fish are rich in n-3 long chain polyunsaturated fatty acids [1] of excellent nutritional value. However, they are very prone to oxidation which is also favoured by processing. In Tunisia, silversides are traditionally dried by spreading out on sand along the beaches for about 4 and 5 days in summer. In attempt to reduce some of the problems associated with losses, especially in lipid quality and time processing, experimental drying with automated conditions have been investigated and compared with traditional drying process.

Materials and methods
Tunisian silversides *Atherina lagunae* (belonging to the same sampling catch) were separated into three lots : (i) the first one was used for raw material, (ii) the second lot was traditionally sun dried, (iii) the third lot was dried using an electric drying unit. The temperature and relative humidity were maintained at 50°C and 15.02 % respectively. After lipid extraction and derivatisation, the resulting methyl esters were analysed using an Agilent Gaz chromatograph system 6890N. Peroxide value PV was determined according to the ferric thiocyanate method [2]. Thiobarbituric acid reactive substances TBARS were determined according to the AOCS method [3].

Results and discussion
In fresh silverside, saturated fatty acids SFA (2.49 g/100g silverside) constitute the majority of the fatty acids pool, followed by monounsaturated MUFA (1.7 g/100g silverside) and polyunsaturated fatty acids PUFA (1.23 g/100g silverside) (Table 1).

Tab. 1. Fatty acid profile (expressed as g fatty acid /100g edible silverside) of total silverside *Atherina lagunae* lipids

Fatty acid	FS	SDS	EDS
Total SFA	2.49 ±0.06	7.09 ±0.08	7.38 ±0.08
Total MUFA	1.70 ±0.07	4.43 ±0.08	5.03 ±0.08
Total PUFA	1.23±0.13	2.96 ±0.12	3.51 ±0.16

N-3 and n-6 PUFA levels were 0.59 and 0.62 g/100g fresh silverside respectively, in which, 22:6 n-3 and 18:2 n-6 were the prominent PUFA. Drying processes show significant differences ($p<0.05$) in fatty acid content. Therefore, all fatty acid groups increased within drying treatment with higher levels in experimental drying process. These results suggest that dried silverside is a good source of n-3 and n-6 fatty acids. Results show that drying process had a significant effect ($p < 0.05$) on the formation of primary oxidation products in the samples, with higher PV levels obtained in solar dried silverside.

Tab. 2. Changes in PV and TBARS of silverside *Atherina lagunae* during solar and experimental drying process. PV: peroxide value. TBARS: Thiobarbituric acid reactive substances. MA: malonaldehyde

	FS	SDS	EDS
PV (meq active O_2/kg oil)	0.73 ±0.06	3.41 ±0.11	2.58 ±0.13
TBARS (mg MA/kg oil)	0.48 ±0.06	1.27 ±0.09	0.87 ±0.07

The increase in PV levels is probably due to the temperature of drying and the high content of unsaturated fatty acids. Such results are in agreement with other authors [4] who reported that peroxide value of *migaki-nishin* lipid increased rapidly from 5.52 to 11.86 meq/kg within 4 days of drying and then gradually increased up to 10 days of drying (16.07 meq/kg). The initial value of TBARS was 0.48 mg MA/kg oil, suggesting that lipid oxidation did not occurre during post-mortem handling to some extent. From this result, TBARS slightly increased within drying treatment to reach in solar and experimental dried silverside1.27 and 0.87 mg MA/kg oil respectively.

Conclusion
Results show that solar and experimental drying processes have significant effects on lipid quality. Fresh silverside showed considerable polyunsaturated fatty acids content, and these results suggest that dried silversides are good sources of n-3 and n-6 fatty acids.

References
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