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ScienceDirect

Aquatic Procedia 7 (2016) 100 – 105

Aquatic Procedia

www.elsevier.com/locate/procedia

2nd International Symposium on Aquatic Product Processing and Health
ISAPPROSH 2015

Changes of Amino Acids and Quality in Smoked Milkfish [*Chanos chanos* (Forskal 1775)] Processed by Different Redestilation Methods of Corncob Liquid Smoke

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Abstract

The application of corncob liquid smoke using different redestilation (without redestilation; zeolite and activated carbon) to increase the quality of smoked milkfish had been conducted. The aim of this research was to determine the changes of amino acids (glutamic, histidine and lysine) and quality (moisture, histamine, and salt content) in smoked milkfish processed by different liquid smoke redestilation methods. Observation was done on three treatments of smoked fish-groups BK: processed by corncob liquid smoke without redestilation; BZ: processed by corncob liquid smoke redestilate with zeolite; and groups BA: processed by corncob liquid smoke redestilate with activated carbon. Different redestilation methods gave the significant different effect ($p < 0.05$) to amino acids and quality of smoked milkfish. Smoked milkfish with BK method found, the dominant amino acids such as histidine, glutamic, and lysine; but less in histamine content. After being smoked, the glutamic, histidine, and lysine contents in smoked milkfish processed by liquid smoke using different redestilation methods were decreased by the declining of its quality, which was being observed at moisture range of 61.11 % to 52.91 %; histamine content at range of 1.69 $mg \cdot g^{-1}$ to 0.34 $mg \cdot g^{-1}$ and salt content at range of 4.53 % to 0.72 %.

Peer-review under responsibility of the science and editorial board of ISAPPROSH 2015

Keywords: Amino acids; corncob liquid smoke; redestilaton method ; smoked milkfish

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Peer-review under responsibility of the science and editorial board of ISAPPROSH 2015
doi:10.1016/j.aqpro.2016.07.013

1. Introduction

Nowadays, fish that smoked using liquid smoking method are often done to produce a high quality smoked fish, which are typically less moisture content, lower salt and histamine than traditional method. Currently, the effects of liquid smoke on colour and sensory are at least as important as preservative effect. Histamine was often reported in seafood, mainly in the scombroid fishes. Histamine is generally not uniformly distributed in a decomposition of fish. It is derived from bacterial decarboxylation of amino acid histidine (Tao et al., 2011 and Patange et al., 2005). There were three different methods of smoking process in this research: corncob liquid smoke without redestilation; redestilate with zeolite; and liquid smoke redestilate with activated carbon. There are little informations on the effect of different redestilation methods of liquid smoke to the shelf-life of smoked milkfish and the objectives of this study were to investigate the effect of different redestilation on the amino acids and quality of smoked milkfish.

2. Material and methods

2.1. Smoking process

The fish were dipped in the 5 % brine solution, and then dipped in the 3 % liquid smoke solution. Liquid smoke was produced from corncob. The dipping process were divided into three groups: (i) the fish dipped in liquid smoke without redestilation were used as control; (ii) the fish dipped in liquid smoke redestilate used zeolite; and (iii) the fish dipped in liquid smoke redestilate used activated carbon. The processing time and temperature in the kiln were divided into three stages: (i) a preliminary drying and cooking period (1 h) at 40 ºC to 50 ºC; (ii) a smoking and partial cooking period at 60 ºC to 70 ºC (1 h); (iii) a last drying at 80 ºC to 90 ºC (1 h). After heating and cooling process, the amino acids (histidine; glutamic; and lysine) and quality (histamine; moisture; and salt content) of smoked fish were observed.

2.2. Amino acids analysis

Amino acid compositions were determined by HPLC (waters corporations, USA). Amino acid standard solution used for calibration from Thermo Scientific, AccqTagclumn (3.9 mm × 150 mm), at 37 ºC temperate; mobile phase acetonitril 60 %-AccqTag Eluent A.Flow rate 1.0 mL · min^{-1} with fluorescence detector. Volume injected for each sample was 5 µL.

2.3. Quality characteristic analysis

- Histamine analysis

Histamine analysis was objected using Thin-layer chromatograph on 10 cm × 20 cm Cellulose TLC plates (Merck KGaA Germany). Samples or standard solution of histamine 5 µL was applied to the plates from edge of the plate. The TLC plate was developed in the mobile phase ammonia-ethanol 3:1 (v/v).

- Moisture content analysis

Moisture content was determined by moisture analyzer instrument (Ohauss MB45).

- Salt content analysis

Salt content in the fish muscle was objected by the volumetric method of Volhard (AOAC, 1980). The salt content was calculated as percentage of the sample.