Influence of Thawing Methods and Storage Temperatures on Bacterial Diversity, Growth Kinetics, and Biogenic Amine Development in Atlantic Mackerel

Limited knowledge is currently available on the influence of fish thawing and subsequent storage conditions on bacterial growth kinetics, succession, and diversity alongside the production of biogenic amines. This study aimed to address these factors during the thawing and subsequent storage of mackerel. Thawing was either done fast in 18 degrees C water for 2 h or slowly at 30 degrees C overnight. Subsequent storage was at 30 degrees C (ambient) for 36 h and 2 to 5 degrees C (refrigerated) for 12 days. The cultivation methods used were total viable counts, hydrogen sulfide producing bacteria, and Pseudomonas. Maximum growth rate, population density, and lag time were fitted on the counts using the Baranyi model. The bacterial diversity and succession were based on sequencing of 16S rRNA amplicons, and biogenic amines were quantified on high-pressure liquid chromatography UV. The results show that lag time of hydrogen sulfide producing bacteria was significantly affected by both thawing methods, and further, the interaction between thawing and storage significantly affected the maximum growth rate of these bacteria. However, the maximum growth rate of Pseudomonas was higher during refrigerated storage compared with storage at ambient temperature. Total viable counts showed longer lag time and reduced growth rate under refrigerated storage. Higher bacterial diversity was correlated to slow thawing and storage at ambient temperature compared with slow thawing and refrigerated storage. Overall, Acinetobacter and Psychrobacter genera were the dominant bacterial populations. The amine levels were low and could not be differentiated along the thawing and storage approaches, despite a clear increase in bacterial load, succession, and diversity. This corresponded well with the low abundance of biogenic amine producing bacteria, with the exception of the genus Proteus, which was 8.6% in fast-thawed mackerel during storage at ambient temperature. This suggests that the decarboxylation potential is dependent on both microbial load and microbial community structure.

General information
Publication status: Published
Organisations: National Food Institute, Research group for Genomic Epidemiology, United Nations University Fisheries Training Programme, Matís ltd.
Contributors: Onyang, S., Palmadottir, H., Tomason, T., Marteinsson, V. T., Njage, P. M. K., Reynisson, E.
Number of pages: 9
Pages: 1929-1937
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Journal of Food Protection
Volume: 79
Issue number: 11
ISSN (Print): 0362-028x
Ratings:
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.68 SJR 0.769 SNIP 0.811
Web of Science (2016): Impact factor 1.417
Web of Science (2016): Indexed yes
Original language: English
Keywords: Bacterial succession, Decarboxylation, Histamine, Mackerel, Pseudomonas, Spoilage, Microbiology, Food Science
DOIs: 10.4315/0362-028X.JFP-16-094
Source: FindIt
Source-ID: 2348911861
Research output: Contribution to journal › Journal article – Annual report year: 2016 › Research › peer-review