



OFFICIAL CONTROL OF DRY-AGED AND DRY-CURED FISH PRODUCTS: A CASE STUDY BASED ON A FOOD SAFETY AUDIT

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Aim. Emerging fish processing techniques, such as dry aging and dry curing, are increasingly being adopted by food business operators to enhance the sensory characteristics of seafood products. Similar to meat aging, these processes involve the use of dedicated cabinets in which products are exposed to monitored and controlled environmental conditions for periods ranging from a few days to several weeks. In dry aging, fish is simply eviscerated, scaled, and hung directly inside the cabinet, whereas dry curing involves the addition of salt, sugar, seasonings, spices, and/or additives. This study describes the findings of a single official audit, carried out in accordance with Regulation (EU) 2017/625 at a registered seafood processing and retail establishment producing dry-cured and dry-aged fishery products.

Methods. The audit assessed compliance with Good Hygiene Practices, HACCP-based procedures, and the overall Food Safety Management System (FSMS). Three products were sampled during the audit: two dry-cured products, namely a 10 days cured Atlantic salmon (*Salmo salar*) fillet prepared with salt, dextrose, sucrose, and smoke flavouring, and a sockeye salmon (*Oncorhynchus nerka*) salami cured and seasoned for 21 days and one dry-aged bluefin tuna (*Thunnus thynnus*) loin. The two dry-cured products were analysed for the enumeration of *Bacillus cereus*, *Listeria monocytogenes*, coagulase-positive staphylococci, sulfite-reducing clostridia, *Clostridium perfringens*, and β -glucuronidase-positive *Escherichia coli*, as well as for the detection of *L. monocytogenes*, *Salmonella* spp., *Vibrio cholerae*, and *Vibrio parahaemolyticus*. The dry-aged bluefin tuna loin was analysed for histamine concentration.

Results. The audit found generally satisfactory structural and hygienic conditions, with one minor non-compliance related to the potential contamination risk posed by a wooden structural beam in the processing area. Additional observations concerned the FSMS, including gaps in product descriptions and flow diagrams, hazards and critical control points, environmental monitoring procedures, incoming raw material controls and operational sanitation procedures. Laboratory analyses of the two dry-cured products showed compliance with the applicable microbiological criteria for all tested parameters, according to Regulation (EC) No. 2073/2005 and Italian State-Regions Conference Agreement 212/2016. The dry-aged bluefin tuna loin showed a major non-compliance for histamine, with concentrations exceeding the applicable regulatory limits in eight of nine sample units: one exceeded 900 mg/kg, five exceeded 200 mg/kg, two ranged from 100 to 200 mg/kg, and one was below 100 mg/kg.

Conclusions. This case study shows that official audits combined with targeted laboratory analyses can identify relevant food safety issues in establishments producing dry-aged and dry-cured fishery products. While the two dry-cured products met the applicable microbiological criteria, the dry-aged bluefin tuna loin showed a relevant histamine non-compliance. However, the contribution of the dry-aging process itself cannot be established because histamine concentrations in the raw material before processing were not available. Further studies under controlled processing conditions, including pre- and post-process analyses, are needed to clarify the factors influencing histamine formation and to support the development of risk-based procedures for these emerging fishery products.