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Prevention of microbial spoilage in traditional food factories by ozone

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Introduction. The production of some European fermented food, *i.e.* cheeses and wines, occurs frequently in small factories with the employment of traditional materials having technological relevance but, also, difficulties of sanitization. Among these, wood represent a typical case. Wood is employed in the fabrication of tools involved in the production of fermented food such as barrels for wine aging or shelves for seasoning of cheese. The sanitization of these apparatus is usually performed by chemical sanitizers with the risk of poor efficacy and cross-contamination due to the residues of chemicals. The use of ozone could be a promising alternative.

Methods. In this work we present some applications of ozone in the prevention of proliferation of spoilage microbes applied to barriques, large barrels, wine grapes, and shelves for seasoning of cheese. Ozone was in-situ produced by a generator based on the Dielectric Barrier Discharge (DBD). For each application we describe the modification of the microflora due to the action of ozone combining cultural (plate count and genotypic characterization) and culture-independent (pyrosequencing) methods. When the interaction between wood and food, or materials, has a relevant impact for the quality of final products, we evaluated the effects of ozone by specific tests and high-resolution analytical techniques (GC-MS, FT-IR).

Results and Discussion. Obtained results confirmed that the ozone is a valuable alternative to the traditional agents, able to guarantee the control of spoilage microflora independently from the nature of microbes involved in the various productive process. We observed an effective contrast to development of *B. bruxellensis* (wine), *B. cinerea* (grape), and red-brown defect microbial consortia (cheese). Furthermore, the high reactivity of ozone ensures its disappearance after few minutes of treatment. The chemical characterization of materials and food matrices treated by ozone not revealed alterations and, conversely, underlined their depreciation due to uncontrolled development of microflora in untreated samples.

Keywords: Wine, Cheese, Ozone, Microbial Food Spoilage