EC MICROBIOLOGY
Editorial

The Role of Food Microbiota on the Definition of Shelf life

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Food product shelf life is determined based on the time during which the food product, stored under the recommended conditions, will remain safe and retain the desired sensory characteristics [1].

Considering the safety aspect, food products must be produced according food safety objectives, which are based on risk assessments and implemented with good manufacturing practices and HACCP systems, allowing integrating risk assessment and hazard management practices.

For some foods, when a recontamination is probable to occur, as during slicing and packaging cooked meat products [2,3], or when normal processing does not eliminate the pathogen(s) of concern, as in some raw milk based cured cheese, shelf life should be determined based on the period of time in which the pathogen of concern will remain below the hazardous level to the consumer [4]. Microbiological challenge tests are useful to the industry to validate food safety processing, namely processes intended to inhibit target pathogen(s) growth or/and inactivation or/and to shelf life determination, based on the microbiological safety of the food product, being very useful for food products that may support the growth of pathogen(s) and are chilled stored [5,6]. The principal of challenge testing is quite simple: if the goal is to eliminate/retard a target microorganism growth through some technological process and/or specific hurdles in a food product, the solution is to challenge that target microorganism in real processing conditions to check its behaviour. Challenge tests are reported to be very useful in refrigerated processed foods of extended durability, being part of the code of hygienic practice of international guidelines [7] for this type of food products. However, adequate challenge testing design is complex, being multifactor dependent, namely how the food product is formulated, manufactured, packaged, distributed, prepared and consumed [8]. With the results of a challenge test, it is possible to define the shelf life to the period before the target infectious pathogen (*Listeria monocytogenes*, *Salmonella* spp., *Escherichia coli*, or other) abandon the lag phase, usually detected by a growth in the population of one logarithmic unit [3].

Once there are guarantees that the food will not lost its microbial safety during the storage, another concern should be addressed: the eventual loss of sensory characteristics, which in perishable products is mainly due to microbial activity. These are normally associated to the growth of spoilage microorganisms and/or the accumulation of several metabolic compounds from their metabolism. Therefore, it is fundamental to identify the spoilage microorganisms that will persist and/or proliferate during the recommended storage conditions and which might compromise shelf life. Some members of lactic acid bacteria and *Enterobacteriaceae* are producers of both D- and L-lactate [9,10]. The catabolism of amino acids, usually associated to the growth of *Enterobacteriaceae* and *Pseudomonas* spp., leads to the production of ammonia, amines and other odour active compounds that are recognised as putrid odours [11]. The main event associated to spoilage involving the lipid fraction is oxidation, resulting in a variety of breakdown products which originate off-odours and off-flavours [12,13]. Though lipid oxidation is a phenomenon mainly of chemical origin, the previous lipolysis occurring as a result of spoilage microorganism growth, namely *Pseudomonas* spp., might increase considerably the lipid oxidation process. Nevertheless, final food product shelf life validation, even for products susceptible to microbiological growth, is still dependent on consumer acceptance [14]. Considering that food products spoilage is complex, resulting from a combination of biological and chemical activities that may interact [15], multivariate approaches to spoilage through microbiological, physicochemical and sensory parameters has been performed in several food products in order to predict shelf life [16-18]. However, there are a limited number of studies establishing the relationship between the spoilage phenomena and the consumer rejection.

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