Ensuring safety in artisanal food microbiology

To the Editor — In her recent Feature ‘Artisanal food microbiology,’ Arielle Johnson¹ suggested that “culinary microorganisms” and the fermentations they carry out could be exploited in restaurant kitchens to “create new flavours”. This is an original and attractive proposal that could meet the increasing demand for novel culinary experiences. As microbiologists, we were excited to read about the use of microorganisms by renowned chefs to invent new foods. However, while discussing the benefits of this gastronomic approach, Johnson does not take into adequate consideration the risks of fermenting in non-specialized facilities, such as restaurant kitchens. Fermentation is an ancient method for food preservation² and, under some circumstances, it improves the nutritional properties of ingredients³: perishables, such as milk, meat and fresh vegetables are transformed into microbiologically stable products that can be safer to eat due to the generated acids that prevent proliferation of pathogens⁴. However, spontaneous fermentation by autochthonous microorganisms in the ingredients requires careful understanding and control of the processes to avoid food poisoning or worse⁵. Foodborne pathogens including *Listeria monocytogenes* and enterohaemorrhagic *Escherichia coli* have been found to adapt to acidic and salty environments^{6,7}, such as those used in food fermentation. Furthermore, even ‘culinary’ lactic acid bacteria may produce biogenic amines that could cause headaches and nausea or even anaphylactic shock in sensitive subjects⁸.

Taking fermentation out of the hands of food producers, who possess knowledge, experience, specialization and inspiration and who have safely produced fermented foods for decades, may pose threats

to human health. Those championing this *nouvelle vague* should educate restaurants and home cooks to verify the microbiological quality of the ingredients and to understand, monitor and check the whole pipeline of the fermentation process to avoid proliferation of pathogenic microorganisms or contamination with unsafe or undesired metabolic byproducts. Indeed, in those countries where fermented products are historically consumed, a large number of small and specialized artisanal factories produce cheeses, kefirs, kombuchas, salamis and many other fermented products with unique organoleptic qualities by following well-controlled and safe processes.

We are living in an era of changes in the way food is produced and consumed. While in the 1990s consumers moved out of their kitchens to have meals outside their homes or bought ready-to-eat foods, the years to come will see changes in the food production–consumption paradigm, with consumers becoming food producers in their homes. In this scenario, as Johnson describes, the “successful exploration in artisan microbiology requires a taste for self-education and empiricism, as well as what can best be described as a cultivated intuition or knack, making for a skillset somewhere between craft and science.” Such exploration may be fascinating and intriguing, but necessary measures to minimize health risks must be considered. We suggest that microbiological safety should be translated into such a ‘new wave’ cuisine through: (i) the implementation of food safety management systems following established procedures for food manufacturing; (ii) the constant interaction of chefs with experts in the field of microbiological safety of fermented foods; (iii) the communication to the consumers of the

microbiological safety and quality of the homemade fermentations; and (iv) the assessment of the microbiological quality of novel fermentation recipes by modern meta-omics approaches.

The complex nature of food fermentation requires a large knowledge base and its management requires experienced manufacturers who could collaborate with chefs, gourmets and gastronomes, but who should retain responsibility for preparing safe products. If the envisaged developments are “exciting (and, hopefully, delicious),” they must also be implemented under rigorous safety policy frameworks. □

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