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Editorial

Food Microbiology: Dairy Products' Microbiota

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The examination of dairy products involves the application of omics approaches to screen varied collections of microorganisms. This enables us to observe shifts in microbial populations, identify novel microbial species and variations, and explore potential microbial functions, metabolites, and metabolic pathways. The composition of the microbiota in dairy products serves as a predictive indicator for a range of factors, including animal health (including metabolic conditions and mastitis) and their consequent impacts on milk and dairy product quality. Additionally, these factors affect nutritional aspects, gastrointestinal microbiota, and consumer well-being. They also play a crucial role in the development of region-specific dairy products and specialty items. While one might assume that the advent of omics technologies would answer fundamental questions about the biodiversity of fermented dairy products, this is far from reality. Many artisanal and traditional products remain largely unexplored by these technologies. The bacterial composition of these products is not well understood, and they exhibit significant variations not only among different regions but also among different producers. However, this situation offers the exciting possibility of discovering specialized strains with unique characteristics. When used as starter or adjunct cultures, these strains have the potential to impart valuable sensory attributes to large-scale dairy products. Additionally, these strains may produce unidentified molecules that could play a role in fermentation processes. Therefore, comprehending and deciphering the microbiota of cheese and other fermented products is a crucial step in enhancing their quality and safety. Bacteria, yeasts, molds, and viruses can contaminate the entire dairy production process, leading to quality or safety concerns. Yet, sometimes, these incidents can result in exceptional products, underscoring the importance of utilizing advanced genomic and molecular techniques to track these microbial intruders.

The main objective of this Special Issue was to highlight the significance of the microorganisms present in fermented dairy products. Understanding the relationships, interactions, functions, and diversity within the microbiota associated with dairy products is essential for advancing the contemporary dairy sector. This can improve dairy production practices by promoting biologically safe and standardized dairy product manufacturing, benefiting both the broader industry and traditional dairy facilities and farms financially.

In this Special Issue, we present eleven papers that enhance our comprehension of this subject. Among them, the paper of Tzora and Nelli et al. explores the characterization and establishment of the standard core microbiota in Feta PDO cheeses throughout the ripening process. They employ the culture-dependent technique MALDI-TOF MS Biotyper [1]. In a second article, Pakroo and Ghion et al. investigate and assess the protective benefits of using 2′-fucosyllactose (2′-FL), a trisaccharide found in human milk, in the microencapsulation of *Streptococcus thermophilus* TH 982 cells [2]. In a third manuscript, Plessas and Ganatsios et al. describe the technological characteristics of a recently isolated strain, namely *Lactobacillus paracasei* SP5, obtained from kefir grains. They study its applications in the production of white brined cheese, both as a free cell culture and when immobilized in trahanas cereal–milk fermented food [3]. In a fourth study, the research team led by Lianou and Michael et al. investigates the possible connections between somatic cell counts (SCC)

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and total bacterial counts (TBC) in bulk-tank milk sourced from sheep and goat farms in Greece. They analyze these relationships while considering the influence of different animal breeds [4]. Aprea and Alessiani et al. have concentrated their efforts on characterizing the "cultivable" core microbiota of lactic acid bacteria (LAB) in the well-known traditional Italian cheese Pecorino di Farindola. Their study has led to some noteworthy findings, particularly regarding the identity of the dominant bacteria [5]. The study by Busetta and Garofalo et al. is the first-ever exploration of the potential interactions within food equipment microbiology, specifically focusing on a wooden table known as "mastredda", which is utilized in the acidification process of Provola dei Nebrodi (PDO) cheese. Their study sheds light on the relationship between this equipment and the microbiota responsible for the unique characteristics of the dairy product [6]. Allaion and Barrionuevo et al. conducted a study to chart the microbiological attributes of Minas artisanal cheese, which is the most widely consumed artisanal cheese in São Paulo. Their study emphasizes the presence of common food-borne bacterial pathogens, including *Listeria monocytogenes*, *Salmonella* spp., coagulase-positive enterotoxigenic staphylococci, and *Escherichia coli* [7]. Once again, Minas artisanal cheese takes center stage in the study conducted by Allaion and Barrionuevo et al. They investigate the hypothesis of whether the isolated *Staphylococcus aureus* strains exhibit tolerance to biocides, antibiotic resistance, and the presence of staphylococcal enterotoxin genes. The authors also emphasize the importance of more deeply understanding the roles of proper hygiene and manufacturing practices in safeguarding consumer health [8]. The article by Hozzein and Hisham et al. illustrates that within the domain of fermented dairy products, a harmonious relationship between animal- and plant-based production is attainable. They discuss the production of fermented rice milk yogurt achieved by fermenting broken rice milk enriched with lactic acid bacteria (LAB) sourced from traditional yogurts and conventional dairy starters [9]. Wadhawan and Steinberger et al. conducted an examination of wooden boards sourced from cheese-ripening facilities. Their objective was to study the native bacterial communities present on these boards and determine whether these communities act as inhibitory agents against the growth of *L. monocytogenes*. They employed a combination of 16S rRNA amplicon sequencing and co-culturing methods to characterize these potentially inhibitory microbial communities [10]. Pavlatou and Nikolaou et al. discuss probiotics. Their initial research focuses on assessing the potential probiotic properties of *Pediococcus acidilactici* ORE5, a wild-type strain isolated from kefir. Subsequently, they aim to create a novel functional cheese in the style of Katiki Domokou, incorporating immobilized *P. acidilactici* ORE5 into pistachio nuts. Finally, they evaluate the inhibitory effect of *P. acidilactici* ORE5 against *L. monocytogenes*, a classic food-borne pathogenic bacterium associated with cheese safety. This study contributes new insights in the field of dairy product safety [11].

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