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*Editorial*

# New Insights into the Application of Lactic Acid Bacterial Strains in Fermentation 2.0

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Lactic acid bacteria and *Bacillus* species are not only microorganisms that are often used in fermented products and food industries but they are also considered human probiotics because their metabolites are beneficial to organisms. In addition, some plant materials can also be used by these probiotics. Fermentation increases the value of a food product. In recent years, extensive research has been conducted on the application of probiotics. This Special Issue showcases relevant research and provides an overview of recent studies on this topic. A study showed that *Lactobacillus plantarum* ST16 Pa, *Bifidobacterium lactis* BL 04, *Lactococcus lactis* CECT-4434, and *Lactobacillus lactis* 27 can generate bacteriocin-like inhibitory substances against pathogenic *Streptococcus mutans* [1].

In addition to their inhibitory effect on pathogenic microorganisms, lactic acid bacteria can also be applied to fermented feed. Oat silage treated via fermentation is a simple and effective solution for alleviating the shortage of feed for ruminants. In one study, oat silage was inoculated using lactic acid bacteria for fermentation to investigate the changes in chemical composition characteristics caused by an increase in temperature during the fermentation process. After oat silage had undergone inoculation using local laboratory and commercial inoculants, it was stored in an environment below 10 °C or fermented under stage-increased temperatures for 60 days. It was found that treatment under stage-increased temperatures can improve the efficiency of feed fermentation. The main dominant strain is *Lactiplantibacillus plantarum*, which contains high levels of lactic acid, acetic acid, and propionic acid content. This study reveals that the inoculation of oat silage with lactic acid bacteria can promote the fermentation of silage [2].

In addition to the general lactic acid bacteria, *Enterococcus faecalis* has been used as a fermentation strain to enhance the conversion of phytochemicals and thus increase the content of phenol and saponin in *Solenostemon monostachyus*. The results of a study investigating this strain indicate that *Enterococcus faecalis* secrete α-amylase to catalyze the biotransformation of phytochemicals, thus enhancing the health value of leafy vegetables and improving health [3].

Exopolysaccharides are carbohydrates secreted by lactic acid bacteria during cellular metabolism, which are water-soluble with special physical properties. The use of different nutrients as culture media for lactic acid bacteria may yield exopolysaccharides with different molecular weights, different chemical structures, and different biological properties. Liu et al. (2023) isolated different exopolysaccharides produced from goat milk through fermentation with five lactic acid bacteria (*Limosilactobacillus fermentum* B55, *Limosilactobacillus fermentum* B62, *Lactiplantibacillus plantarum* 7830, *Pediococcus acidilactici* B30, and *Lactobacillus helveticus* K2). Their results demonstrate that lactic acid bacteria can promote acid production and improve the texture of fermented goat milk, as well as increase the acidity, hardness, consistency, and viscosity of the product [4]. In addition

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to pure plants and pure dairy products, products that are mixed with plants and dairy products and then fermented with lactic acid bacteria have also been developed, such as mixed barley and milk fermented with lactic acid bacteria. This mixed product contains vitamins, minerals, and essential amino acids [5]. Taiwan quinoa (*Chenopodium formosanum* Koidz.), a vitamin-rich grain native to Taiwan, has been shown to elevate antioxidant substances (including total flavonoids, gallic acid, quercetin, and GABA) through fermentation with mixed *Lactiplantibacillus plantarum* with *Lactobacillus delbrueckii* subsp. *bulgaricus*, and *Streptococcus thermophilus*, which can enhance glucose transporter expression in hepatic cells and thus potentially improve diabetes control [6].

Mahweu is an important nutritional beverage for undernourished consumers in Southern Africa. It contains phytochemicals and amino acids generated through maize fermentation inoculated with sorghum malt, wheat, millet malt, or maize malt [7].

Promising results have also been reported in recent studies on the production of active metabolites by the *Escherichia coli* expression system. One of the contributions highlights the first approach to achieving a dynamic working model for biotechnological tryptophan production in *Escherichia coli* [8].

In addition to their use in fermentation engineering, probiotics also play an important role in regulating the intestinal flora of organisms. Intestinal floras are related to many diseases, but many intestinal floras may not be regulated by probiotics. To the best of our knowledge, the cellulose and phytochemicals contained in plants have the potential to improve intestinal flora, and *Gratopetalum paraguayense* E. can improve intestinal flora and diabetes activity [9].

Lactic acid bacteria and intestinal beneficial bacteria have long been considered to have an important association with the health of organisms. In addition to the application of these microorganisms in food processing, their impact on the host and the growth regulation of other microorganisms are also important topics. This Special Issue highlights the protective effect of some potential probiotics and prebiotics on the host. Since many diseases have been found to be associated with intestinal microorganisms, in the future, through individualized diets and analysis results, specific microbial formulas will be generated for the application of microbes in precision medicine and the development of group meals.

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