

Chapter 12

B-Group Vitamins Production by Probiotic Lactic Acid Bacteria

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Lactic acid bacteria (LAB), widely used as starter cultures for the fermentation of a large variety of foods, can improve the safety, shelf life, nutritional value, flavor, and overall quality of the fermented products. In this regard, the selection of strains delivering health-promoting compounds (nutraceuticals) is now the main goal of several studies. Among these studies, vitamin production by LAB has recently gained attention of the scientific community. Although most LAB are auxotrophic for several vitamins, it is now known that certain strains have the capability to synthesize B-group vitamins. Humans cannot synthesize most vitamins, and these compounds have to be provided exogenously. Although most essential vitamins are present in a variety of foods, vitamin deficiencies still exist in many countries. Thus, LAB are the ideal candidates for delivering vitamins, among other specific compounds, into foods. Certain fermented milks have shown high levels of B-group vitamins due to LAB biosynthesis. Folate biosynthesis by yogurt starter cultures can increase the “natural” folate levels in this product. These folates do not cause dangerous side effects, such as masking of B₁₂ deficiencies, as does folic acid, the chemical form of folates commonly used in food fortification. Although little is currently known about riboflavin (vitamin B₂) production by LAB, the genes involved in their biosynthesis have been identified in several species. Cobalamin (vitamin B₁₂), a complex corrin compound, was found to be produced by certain strains of Lactobacillus reuteri, particularly CRL1098, a

probiotic microorganism. These microorganisms use cobalamin to catabolize glycerol and to produce reuterin, a well-known antimicrobial compound. Since many LAB are recognized as probiotics, their capacity to produce B-group vitamins could be useful for the design of novel functional foods that are able to prevent vitamin deficiencies by enhancing the nutritional value of food products.

12.1. Introduction

Lactic acid bacteria (LAB) are a group of microorganisms that are broadly used as starter cultures for the elaboration of fermented foods. Besides their industrially important fermentative capacities, LAB can also improve the safety, shelf life, nutritional value, flavor, and overall quality of fermented products. In addition, LAB have been shown to exert a large range of beneficial properties, the reason for which they are frequently used as probiotic microorganisms in a variety of novel products. In 2002, the Food Agriculture Organization (FAO) defined probiotics as “live microorganisms which, when administered in adequate amounts, confer a beneficial health effect on the host.” The probiotic and beneficial aspects of LAB have been intensely reviewed elsewhere and will not be the subject of this chapter.

In addition to their intrinsic beneficial properties, certain strains of LAB have the capability of producing, releasing, and/or increasing specific beneficial compounds in foods. These functional ingredients