ANTIMICROBIAL RESISTANCE OF LACTIC ACID BACTERIA IN FERMENTED FOOD

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Abstract

Lactic acid bacteria (LAB) have a long history of safe use in fermented food production and consumption that support their generally recognized as safe (GRAS) and qualified presumption of safety (QPS) status provided by US Food and Drug Administration (FDA) and European Food Safety Authority (EFSA), respectively. FDA Antimicrobial resistance (AMR) is one of the leading public health issues which is closely related to farm animals, environment and food of animal origin.

Safety aspects of microbiota related to fermented food products are evaluated during last decades. Resistance in LAB is enhanced by the large numbers of LAB in fermented products and in the gastro-intestinal tract, but also from other bacteria in the environment. Once a LAB becomes resistant, amplified determinant can be transmitted to another host. Therefore, checking for signs of transferable antibiotic resistance in starter strains and bacteria used as feed and food additives is essential. The determination of the antibiotic resistance profiles of LAB is mostly based on the use of numerous phenotypic methods. However, there is no consensus on breakpoints for most antimicrobials. The confusion in this area is primarily due to the fact that different methods are used to define resistance (E-test, determination of minimum inhibitory concentration (MIC), disk diffusion or Kirby-Bauer method, and microdilution), thus preventing direct comparison of results. Phenotypic assays have now been complemented by molecular methods in which bacterial strains are directly screened for the presence of antibiotic resistance determinants. Generally, these methods include amplification by polymerase chain reaction (PCR) with specific primers for single or multiplex antibiotic resistance genes, real time PCR or the use of DNA microarrays containing large collections of antibiotic resistance genes. The existing genetic studies used to confirm the transmission of known resistance determinants are hampered by many experimental factors and thus show variable results. Two of the most commonly observed resistance genes in LAB found so far are tet(M) for tetracycline resistance and erm(B) for erythromycin, followed with cat genes coding for chloramphenicol resistance. The complex issue of AMR requires a wide multidisciplinary approach to predict and avoid the undesirable public health consequences along the whole food-producing chain.

Strategies for reduction of AMR in fermented food microbiota should be based on prudent use of antimicrobials in food animals and application of competitive starter cultures in food fermentation.

***Key words**: Antimicrobial resistance, Lactic acid bacteria, Fermented food, Phenotypic and genotypic methods, Veterinary public health.*