

## Maintenance of microbial consortia from salami: a case study on the impact of cryopreservation

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In recent years, the importance of the conservation of microbial biodiversity has achieved high awareness. Conservation biologists have highlighted that weaknesses in microbial preservation can lead to the loss of valuable bio-resources and gene pools that provide high levels of resistance against changing environmental conditions and adaptation to novel production processes. Community, habitat and intact microbial communities preservation are promising solutions to mitigate and counteract these emerging problems, favouring the biotechnological valorisation of microbiomes. Generally, microbiologists focus their consideration only on culturable microbes and on pure cultures, thus preserving only a tiny fraction of microbial diversity and functional potential of that microbiota. Besides, very few studies have been conducted to study the optimal conditions of storage of microbial consortia and their effect on microbial community structure and the related functional potential. An efficient storing method must be able to maintain microbial strains in a viable state to protect their morphological and genetic stability for a long time under laboratory conditions. Several methods are used for the preservation and maintenance of microorganisms. Usually, lyophilisation and cryopreservation are versatile and widely applicable for a large number of microorganisms. Moreover, the presence of cryoprotectants often increases the survival of microorganisms, and in particular, glycerol and DMSO were shown to protect microbial cells against freezing damage. This study aimed to evaluate the effectiveness of freezing procedures to cryopreserve the microbiota isolated from the surface of an Apulian cured sausage, using glycerol or DMSO as cryoprotectants and two different storing temperatures (-80 °C and -135 °C) for the short and mid-term period. The microbial population of the sausage was studied by culture-dependent method and metagenomic analysis comparing analyses before and after storing period. Results indicated that after 1 and 8 months of cryopreservation, the viability of the bacterial population of microbial consortium decreased at the same rate for both cryoprotectants and storing temperatures. A similar trend was also observed for fungi and yeasts with the exception of storage conditions that include glycerol and temperature of -135°C, which better preserve the viability of yeasts and fungi after eight months. This study pointed out the first scientific evidence on the effect of cryopreservation of the whole microbial consortia collected from the surface of cured sausages.

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