Safety improvement and preservation of typical sensory qualities of traditional dry fermented sausages using autochthonous starter cultures

Régine Talon\textsuperscript{a}, Sabine Leroy\textsuperscript{a}, Isabelle Lebert\textsuperscript{a}, Philippe Giammarinaro\textsuperscript{a}, Jean-Paul Chacornac\textsuperscript{a}, Mariluz Latorre-Moratalla\textsuperscript{b}, Carmen Vidal-Carou\textsuperscript{b}, Emanuela Zanardi\textsuperscript{c}, Mauro Conter\textsuperscript{c} and Annick Lebecque\textsuperscript{d}

\textsuperscript{a}INRA, UR 454 Microbiologie, F-63122 Saint-Genès Champanelle, France
\textsuperscript{b}Departament de Nutrició i Bromatologia, Facultat de Farmàcia, Universitat de Barcelona, Avinguda Joan XXIII s/n, E-08028 Barcelona, Spain
\textsuperscript{c}Dipartimento di Produzioni Animali, Biotecnologie Veterinarie, Qualità e Sicurezza degli Alimenti, Università degli Studi di Parma, 43100 Parma, Italy
\textsuperscript{d}ENITA, UR Typicité des Produits Alimentaires, Site de Marmilhat, F-63370, Lempdes, France

Abstract

Traditional dry fermented sausages are manufactured without addition of starter cultures in small-scale processing units, their fermentation relying on indigenous microflora. Characterisation and control of these specific bacteria are essential for the sensory quality and the safety of the sausages. The aim of this study was to develop an autochthonous starter culture that improves safety while preserving the typical sensory characteristics of traditional sausages.

An autochthonous starter composed of \textit{Lactobacillus sakei}, \textit{Staphylococcus equorum} and \textit{Staphylococcus succinus} isolated from a traditional fermented sausage was developed. These strains were tested for their susceptibility to antibiotics and their production of biogenic amines. This starter was evaluated \textit{in situ} at the French traditional processing unit where the strains had been isolated. Effects of the autochthonous starter were assessed by analysing the microbial, physico-chemical, biochemical and sensory characteristics of the sausages. Inoculation with the chosen species was confirmed using known species-specific PCR assays for \textit{L. sakei} and \textit{S. equorum} and a species-specific PCR assay developed in this study for \textit{S. succinus}. Strains were monitored by pulse-field gel electrophoresis typing. Addition of autochthonous microbial starter cultures improved safety compared with the traditional natural fermentation of sausages, by inhibiting the pathogen \textit{Listeria monocytogenes}, decreasing the level of biogenic amines and by limiting fatty acid and cholesterol oxidation. Moreover, autochthonous starter did not affect the typical sensory quality of the traditional sausages.

This is the first time to our knowledge that selection, development and validation \textit{in situ} of autochthonous starter cultures have been carried out, and also the first time that \textit{S. equorum} together with \textit{S. succinus} have been used as starter cultures for meat fermentation. Use of autochthonous starter cultures is an effective tool for limiting the formation of unsafe compounds in traditional sausage while preserving their original and specific sensory quality.

Keywords: Sausages; Autochthonous starter; Monitoring; Safety; Sensory quality; PCR species-specific