
Microbiomes revealed as key contributors to the link with French PDO cheeses origin

Francoise Irlinger¹ and Céline Delbès*^{†2}

¹Université Paris-Saclay, INRAE, AgroParisTech, UMR SayFood (INRAE, AgroParisTech, UMR) – INRAE – 91120, Palaiseau, France

²UMRF, Université Clermont Auvergne, INRAE, VetAgro Sup (INRAE) – INRAE – Aurillac, France

Résumé

Our aim was to decipher the relationships between the microbiota in milk and associated cheeses, and the geography, farming and cheese processing practices. For that purpose, we have carried out the most exhaustive study to date of the microbial diversity of 44 French PDO cheeses, based on 1,145 cheeses and 390 milks. We characterised the bacterial and fungal communities in cheeses and milks using high-throughput gene sequencing. A total of 820 bacterial species and 333 fungal species were identified in cheeses. On average, almost 15% of the bacterial species and 41% of the fungal species identified in a cheese were also present in the vat milk. Species assemblages in both milk and cheeses differed depending on human drivers, dairy species, and geographical area, thus demonstrating the contribution of regional know-how to shaping the cheese microbiota. A comprehensive comparative genomic analysis of strains isolated from PDO cheeses or other environments and belonging to two genera, i.e., *Vreelandella* (formerly *Halomonas*) and *Monosporozyma* (formerly *Kazachstanina*), revealed phylogenetic clades specific to the cheese environment. Our results highlight the importance of considering the milk-cheese continuum in a microbial biogeographical analysis of cheeses. The microbial profiles obtained in this study will be used to initiate a unique repository of French PDO cheeses and associated practices. Our results will encourage and support stakeholders in the PDO cheese sector to maintain indigenous microbial diversity throughout the milk-cheese continuum, when revising PDO farming and processing specifications in response to the effects of climate change.

Mots-Clés: Microbiomes, PDO, cheese

*Intervenant

[†]Auteur correspondant: celine.delbes@inrae.fr