

Session 4: Non-Clinical Applications

O21 Impact of phages in dairy industry

HORST NEVE

Max Rubner-Institut, Federal Research Institute of Nutrition and Food, Department of Microbiology and Biotechnology, Kiel, Germany

Corresponding author: Horst.Neve@mri.bund.de

All fermentation processes in dairies rely on actively growing lactic acid bacteria as starter cultures. However, bacteriophages infecting these cultures may cause serious fermentation delays or even complete failures. *Lactococcus lactis* and *Streptococcus thermophilus* are prominent bacteria used in mesophilic and thermophilic starter cultures and can be attacked by a broad range of diverse phage populations. For *L. lactis*, 10 different phage groups are currently known, and many lactococcal strains do also contain prophages that can be released as temperate phages either spontaneously, or by induction with mitomycin C. New *S. thermophilus* phage populations have recently been identified as hybrid phages with genome regions derived from lactococcal and from *S. thermophilus* phages. Phages attacking flavor-producing *Leuconostoc* strains are also common in dairies.

Lactococcal phages of the widespread 936 group may possess intrinsic high thermal stabilities,

and pasteurization of raw milk is therefore not a hurdle for these phage derivatives. Recycling of whey or whey components (contaminated by thermo-resistant phages) in subsequent fermentation processes requires non-thermal treatments for minimizing phage titers, e.g. by membrane filtration. Phages of *L. lactis*, *S. thermophilus* and of dairy *Leuconostoc* strains are also present in high titers in spray-dried whey powders, and a remarkable long-term stability has been shown for lactococcal phages in such samples which were stored for several years. Lactococcal phages of the 936 group are clearly dominating in whey and whey powder samples. This, however, may not be the case for raw milk samples where non-936 lactococcal phages were frequently detected in titers of $10 - 10^6$ plaque-forming units per ml. Hence, raw milk can also be considered as a reservoir of new atypical phage populations.