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Rapid detection of viable pathogenic *Yersinia* spp. by fluorescence *in situ* hybridization

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Yersinia enterocolitica, the causative agent of yersiniosis, is the third most frequent bacterial zoonosis of foodborne origin in the European Union, after *Salmonella enterica* and *Campylobacter* spp. Apart from *Y. enterocolitica*, *Y. pseudotuberculosis* and *Y. pestis* are also important human pathogens. Despite their clinical significance, the detection of pathogenic *Yersinia* spp. by traditional cultivation techniques is slow and often hampered by the presence of excessive amounts of accompanying bacterial flora. Fluorescence *in situ* hybridization (FISH), which targets ribosomal RNAs, represents a promising alternative for a more rapid detection of viable *Yersinia* spp. In this study, highly specific fluorophore-labelled oligonucleotide probes were designed for each of the three target species, *Y. enterocolitica*, *Y. pseudotuberculosis* and *Y. pestis*. Additionally, a genus-specific probe, which binds to the rRNAs of all *Yersinia* spp., was used as an internal control and a eubacterial probe was employed to enumerate other viable bacteria. Strong FISH signals were observed in rapidly growing as well as in resting cells. By coupling FISH with a direct viable count approach (DVC), a reliable live/dead differentiation was possible. The suitability of FISH for the detection of *Yersinia* in food was assessed in comparison to ISO 10273:2003. After selective enrichment in Irgasan-Tircacillin-Potassium-Chlorate (ITC) bouillon for 24 hours 1 CFU/g in spiked minced pork meat could be detected with FISH, whereas the detection by ISO 10273:2003 took at least four days. In conclusion, these results demonstrate the potential of FISH as a rapid and sensitive detection method for viable *Yersinia* spp.

Biography

Alexander Rohde is a PhD student at the Freie Universität Berlin and is employed by the Federal Institute for Risk Assessment (BfR) in Berlin since 2013. In his work at the Department of Biological Safety, he examines the applicability of novel rapid detection methods like fluorescence *in situ* hybridization (FISH) for the detection of foodborne pathogens in food.

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