

***Application of FT-IR spectroscopy for tracking and tracing of Staphylococcus aureus along the milk production chain***

Judith Kümmel<sup>1</sup>, Beatrix Stessl<sup>2</sup>, Georg Walcher<sup>2</sup>, Rugaia Idris<sup>1</sup>, Tom Grunert<sup>1</sup>,  
Martina Fricker<sup>1</sup>, Monika Ehling-Schulz<sup>1</sup>

<sup>1</sup>Food Microbiology Unit, Clinic for Ruminants,  
Dept. for Farm Animals and Veterinary Public Health, University of Veterinary Medicine,  
Veterinaerplatz 1, 1210 Vienna, Austria

<sup>2</sup>Institute of Milk Hygiene, Milk Technology and Food Science,  
Dept. for Farm Animals and Veterinary Public Health, University of Veterinary Medicine,  
Veterinaerplatz 1, 1210 Vienna, Austria

One of the most important contagious pathogens connected to mastitis in dairy cattle is *Staphylococcus aureus*, accounting for approx. 30-40% of all cases [1]. *S. aureus* causes severe clinical as well as chronic infections of the mammary gland and is difficult to be cured. Therefore the economic loss for the dairy industry is substantial, although respective hygiene and control programs have been established during the last decade. In addition, *S. aureus* produces heat-stable enterotoxins provoking an emetic type of food poisoning linked to various types of foods, including milk and milk products [2] [3]. So far only little is known about the entrance points of *S. aureus* into the food production chain and whether or not *S. aureus* from mastitic cows can enter the milk production chain via contaminated raw milk. It is of utmost importance to gain knowledge about the origin of *S. aureus* contaminants and their distribution/succession during processing to increase the quality and also the safety of milk and milk products.

Fourier-Transform Infrared (FT-IR) spectroscopy was therefore applied to monitor the succession of *S. aureus* from stable to the table, from cow to cheese. In frame of the EU project "Biotracer" ([www.biotracer.org](http://www.biotracer.org)) a complete cheese production chain was sampled. 1292 quarter milk samples derived from 18 different farmers as well as samples from different cheese production steps and from the final product were analyzed by FT-IR spectroscopy followed by chemometric analysis. FT-IR spectroscopy turned out to be a quite effective and valuable tool to monitor the development of *S. aureus* and other *Staphylococcus* sp. along the cheese production chain to identify possible contamination sources.

**References:**

- [1] Sommerhäuser J, Kloppert B, Wolter W, Zschöck M, Sobiraj A, Failing K. The epidemiology of *Staphylococcus aureus* infections from subclinical mastitis in dairy cows during a control programme. *Vet Microbiol.* 96(1), 91-102 (2003).
- [2] Schmid D, Fretz R, Winter P, Mann M, Höger G, Stöger A, Ruppitsch W, Ladstätter J, Mayer N, de Martin A, Allerberger F. Outbreak of staphylococcal food intoxication after consumption of pasteurized milk products, June 2007, Austria. *Wien Klin Wochenschr.* 121(3-4), 125-31 (2009).
- [3] Asao T, Kumeda Y, Kawai T, Shibata T, Oda H, Haruki K, Nakazawa H, Kozaki S. An extensive outbreak of staphylococcal food poisoning due to low-fat milk in Japan: estimation of enterotoxin A in the incriminated milk and powdered skim milk. *Epidemiol Infect.* 130(1), 33-40 (2003).