FT-IR - a helpful tool in the differentiation of Bacillus species in food control

A. Kuhm, M. Contzen, and J. Rau,

Chemisches und Veterinäruntersuchungsamt Stuttgart, Schaflandstr. 3/2,
70736 Fellbach, Germany

Pathogenic *Bacillus cereus* (*B. cereus*) causes two types of foodborne diseases, the diarrhoeal or the emetic type. The emetic disease is caused by a heat stable toxin (cereulide). Traditionally, *B. cereus* is identified in official food monitoring by a cultural procedure as described in method 00.00-25 according to §64 of the German Food and Feed Law (LFGB). Strains isolated by this method are called "presumptive *B. cereus*". This group comprises closely related sporulating strains such as *B. cereus* sensu stricto, *B. thuringiensis* and *B. weihenstephanensis*.

Fourier transform infrared spectroscopy (FT-IR) has been established as a method for identification of microorganisms. In order to obtain a further differentiation within the "presumptive *B. cereus*" strains, additional biochemical, microscopical and molecular tests were performed. FT-IR in combination with artificial neural network based data analysis was used and methods for the differentiation of those closely related Bacilli were created. With this method *B. cereus* sensu stricto, *B. thuringiensis* and other related Bacilli could be clearly separated. Furthermore this method allows the identification of new potentially pathogenic thermotolerant isolates, "*B. cytotoxicus"* (1) which were clearly separated in FT-IR cluster analysis. Evidence was obtained, that these strains may be important pathogens in vegetable purees, e.g. mashed potatoes.
This example demonstrates that FT-IR is a powerful technique for the identification of new pathogenic bacteria.

References:

[1] J. Rau, R. Perz, G. Klittich and M. Contzen, *Berl. Münch. Tierärztl. Wochenschr.* 122, 25-36 (2009).