

Differentiation of probiotic and environmental *Saccharomyces cerevisiae* strains by FTIR-Spectroscopy and Artificial Neural Networks

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Interest in differentiation of probiotic and non-probiotic strains within a species for quality control purposes is growing. Thus, a reliable identification and classification system using Fourier-transform infrared (FTIR-) Spectroscopy combined with an Artificial Neural Network [1,2] was generated for differentiating environmental from probiotic *Saccharomyces cerevisiae* strains in animal feed.

The system comprises five authorised feed additive strains, isolates used in human nutrition plus environmental strains isolated from a great variety of habitats. A total of 108 isolates were used as reference strains to create an artificial neural network (ANN). DHPLC analysis and δ -PCR, which are characterised by high sensitivity and reproducibility, were successfully used as typing methods for probiotic isolates. The performance of the ANN was tested in two validation steps. First, an internal validation of the system using unknown spectra of each reference strain yielded a classification rate of 99.1 %. For the following external validation a test data set comprising 965 spectra of 63 probiotic and environmental *S. cerevisiae* isolates unknown to the ANN was used resulting in a classification rate of 98.2 %. While two of the five commercial probiotic strains could not be distinguished by FTIR-Spectroscopy, due to high similarity, no probiotic isolate was classified non-probiotic and no non-probiotic isolate was classified probiotic.

Our results demonstrate that probiotic strains of animal feed can be differentiated successfully from environmental isolates using both genotypic approaches and FTIR-Spectroscopy.

References:

- [1] M. Kümmerle, S. Scherer, H. Seiler, *Appl Environ Microbiol* **64** (6), 2207 – 2214 (1998).
- [2] N. Büchl, M. Wenning, H. Seiler, H. Mietke-Hofmann, S. Scherer, *Yeast* **25**, 787 – 798 (2008).