

Differentiation of Salmonella enterica serovar Enteritidis strains for vaccination by infrared spectroscopy

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Enteritidis (of serogroup D1) and Typhimurium (serogroup B) are the most frequently isolated serovars of *Salmonella enterica* in cases of human salmonellosis. To control the main sources of this zoonotic pathogen poultry populations are treated with attenuated live vaccines. The distinction of vaccine and pathogenic wild type strains requires specific assays. For differentiation of two poultry vaccine strains, *Salmonella* VAC E (AviPro®, Lohmann Animal Health, Cuxhaven, Germany) and Salmovac SE (IDT Biologika, Dessau, Germany), from other salmonellas of serogroup D1 a new method was developed by means of Fourier transform infrared spectroscopy (FT-IR) and artificial neural networks (ANN). 548 spectra from 74 serogroup D1 isolates were used for training of the ANN. Both vaccine strains can be differentiated from wild type strains of the same serogroup with a residual risk of less than 1 % using repeat determination.

To evaluate the discrimination power of FT-IR we trained ANN to distinguish all 74 isolates. The learner was trained and cross-validated automatically using RapidMiner (Rapid-I, Dortmund, Germany). Isolates that appeared indistinguishable according to the resulting confusion matrix were fused into new classes and the learning and validating process was repeated with a reduced number of classes. The process ended up in 20 classes of well distinguishable 'spectrovars', revealing the potential for typing salmonella strains, which could be applied for tracing contamination routes.