# Safe food and feed through integrated approaches to control and analyse (emerging) plant and fungal secondary metabolites

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**(Emerging) food contaminants**

Global changes in food systems, along with climate-related impacts such as increased rainfall, are intensifying the risks associated with chemical contaminants in food and feed. These include mycotoxins, tropane alkaloids, and a range of other emerging substances. As a result, there is an urgent need to adapt current food safety management systems and analytical methods to ensure they remain robust, flexible, and resilient under evolving conditions.

This lecture will highlight the pivotal role of advanced analytical technologies in assessing and mitigating risks from mycotoxins, plant toxins, and emerging contaminants to safeguard the safety of food and feed. Emphasis will be placed on recent advancements in analytical chemistry that enable the rapid and accurate quantification of plant- and fungal-derived secondary metabolites, contributing to improved health outcomes for plants, animals, and humans.

Key developments include a fully in-house validated LC-MS/MS method capable of quantifying over 900 fungal and plant secondary metabolites within just 11 minutes. Innovations such as fast polarity switching and scheduled multiple reaction monitoring have significantly increased analytical speed without compromising accuracy. Additionally, a 13C-labeling-assisted LC-HRMS tracer fate study has been successfully conducted, revealing the degradation pathways and mass balances of major mycotoxins—including deoxynivalenol, fumonisins, and aflatoxin B1—during industrial baking processes.

The lecture will also showcase the application of stable isotope-assisted (un)targeted LC-HRMS metabolomics to investigate pathogen-induced changes in the metabolome and to identify novel fungal and plant metabolites involved in plant–fungus interactions. Finally, the integration of targeted LC-MS/MS and untargeted LC-HRMS approaches for horizon scanning will be discussed, illustrating how these methods can be employed to assess the impacts of climate change on toxic secondary metabolites and agrochemical profiles.