

## MYCOTOXIN MIXTURES IN FOOD AND FEED: A HOLISTIC, INNOVATIVE, FLEXIBLE MODELLING APPROACH FOR RISK ASSESSMENT – MYCHIF

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Mycotoxin contamination can occur in many agricultural products used in food and feed. Mycotoxins are produced as the result of fungal metabolism and plant-pathogen interaction. Therefore, many structurally-related congeners, defined as modified mycotoxins are generated by plant and/or fungi metabolism, or food processing, and coexist with their native forms. Studies investigating the co-occurrence of multiple mycotoxins reported 75-100% of samples containing more than one mycotoxin, referring to native compounds and 100% reported multiple modified forms. A major challenge in a risk assessment is to depict the biosynthesis of mycotoxin mixtures and their realistic occurrence. Over the last two years, the MYCHIF research project has been developing integrated and innovative modelling methodologies for the risk assessment of mycotoxin mixtures in food and feed. Particular efforts have been put into the investigation and understanding of complex systems and the identification of knowledge and data gaps.

Extensive literature searches were conducted to identify and collect relevant scientific data on (i) interaction of fungi with crops, (ii) variables influencing the synthesis of mycotoxins, (iii) their co-occurrence in major crops of interest, and (iv) toxicokinetics (TK) and toxicodynamics (TD) including biomarkers of exposure and effects in farm animals and humans. Differences on the toxicokinetic and toxicodynamic parameters of single mycotoxins vs. multiple mycotoxins were considered. Data gaps have been identified for each area of data collection and included lack of consistent data for (i) the co-occurrence of multiple mycotoxins in major crops, and (ii) toxicity of multiple mycotoxins in farm animals and humans. Nevertheless, modelling approaches were considered using TK and TD data for single mycotoxins and assumptions of dose addition for combined toxicity. In order to validate the modelling approaches, case studies were developed from an exposure and a hazard perspective using dose addition for combined toxicity as the default model. A whole food chain risk assessment workflow is proposed for the risk assessment of mycotoxin mixtures in food and feed as well as future work to fill major data gaps identified in the MYCHIF project at the level of co-occurrence and combined TK and toxicity dimensions.

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## THE ROLE OF MYCOTOXINS IN BACTERIAL AND VIRAL DISEASE OUTBREAKS – A REVIEW

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The most frequent type of mould developing on plants in the field is *Fusarium*, producing harmful mycotoxins, such as trichothecenes (mainly deoxynivalenol and T-2/HT-2 toxins), zearalenone and fumonisins. Both deoxynivalenol and fumonisins have demonstrated deleterious effects on the health and performance of animals. Several studies highlight the individual and synergistic impact of deoxynivalenol and fumonisins on intestinal health and also their role in bacterial and viral disease outbreaks by through 3 mechanisms: (i) increasing gut colonisation, (ii) reducing gut barrier efficacy and (iii) altering immune defence. In addition to increasing the risk of bacterial or viral outbreaks, it seems that mycotoxins also modify vaccine response or even drug efficacy.

ABSTRACTS OF LECTURES AND POSTERS

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