CFAI Special Seminar

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農学研究科　大会議室

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In vitro Assessment of Mycotoxin Toxicity and Mitigation

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Mycotoxins are toxic secondary metabolites produced by filamentous fungi, predominantly the Aspergillus, Fusarium and Penicillium genera. Over 500 different mycotoxins have been discovered, many of which have unknown mechanisms of action. Mycotoxins are commonly detected in commodities of plant origin, especially cereal grains, and are therefore, often detected in animal feeds. Ingestion of mycotoxins can lead to mycotoxicosis in both animals and humans, and at subclinical concentrations, mycotoxins may affect animal production and contaminate food animal products. Natural co-occurrence of mycotoxins with potential additive, antagonistic or synergistic effects is most common.

Mycotoxins are a global problem. They inflict high annual economic losses due to condemned agricultural commodities as well as reduced animal and human health, and weather conditions associated with climate change have been predicted to exacerbate production of these toxins. Global trade of food and feed commodities also contributes to the worldwide dispersal of mycotoxins.

The effects of mycotoxin exposure to the intestine need to be more thoroughly investigated both in terms of toxicity and mitigation. We have utilized in-vitro cell culture models as a cost-effective and high throughput means for the initial screening and assessment of mycotoxins and mitigation approaches. Additionally, we have explored individual and combined mycotoxin interactions, toxic mechanisms of action, and interactions between cell types in co-culture systems that better model in vivo exposure. Despite these advancements, in vitro culture systems fall short in assessing the real risk of mycotoxin exposure to whole organisms. Cell lines are not available for all livestock and aquaculture species, and there are species-specific sensitivities to mycotoxin exposure, which may in part be attributed to unique commensal microbiota-host interactions. Also, not all susceptible stages of development can be appropriately modeled in vitro; for example, during pregnancy and lactation, where there is complex interaction between the mother and offspring, and their microbiota. Collectively, these necessitate our continued use of animal models to carry out mycotoxin research.

問い合わせ

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