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Dr. Michael Lilburn reveals how to more accurately evaluate true mycotoxin exposure during IPPE TECHTalk

Rehoboth, DE, USA, 18/1/2024 – Innovad, a leading innovator in animal nutrition and health, is set to reveal a unique in vivo technology that offers the opportunity to more accurately assess mycotoxin exposure and mitigation strategies in the poultry industry during a TECHTalk at the International Production & Processing Expo (IPPE). Dr. Michael Lilburn, Professor Emeritus of The Ohio State University, will present "The Application of Blood Biomarker Technology to Mycotoxin Awareness and Mitigation," on Thursday, February 1, at 12:30, on the TECHTalk stage in booth A244.

Recent work has led to a scientifically validated in vivo technology using blood biomarkers to directly assess the level of mycotoxin exposure. This is a new generation tool that, when combined with feed analysis, gives poultry producers a complete assessment of their mycotoxin risk or mitigation program. Dr. Michael Lilburn will review the development and application of this protocol, Myco-Marker™, and value that users have found in the information it provides during the TECHTalk.

Navigating Mycotoxin Mitigation: Innovations and Advancements

Commercial mycotoxin mitigation products are often designed to effectively “bind” a toxin or change its structure (i.e., enzymes) thereby reducing intestinal absorption and exposure. These are often a proprietary blend of additives that are purported to reduce exposure to multiple toxins. Currently, however, there is only one in vivo assessment tool (i.e., that directly measures samples from live birds and animals) commercially available for monitoring the effectiveness of a given mitigation program.

For many classes of mycotoxins, the circulating form of a given toxin may be the intact toxin itself, but more often there are post-absorptive metabolites or “biomarkers” that reflect the absorption and metabolic transformation of individual toxins. The blood biomarkers for a respective mycotoxin can also vary across species (i.e. DON-sulfate, poultry; DON-glucuronide, swine). The European Food Safety Agency (EFSA) suggested that biomarkers be used to test the effectiveness of proposed mycotoxin “detoxifier” products.Lauwers et al. (2019 a)subsequently conducted a series of experiments in poultry and swine to define the appropriate tissue “matrices” for sampling (blood, excreta, urine) and optimal biomarker for each species based on the published literature. An oral administration of selected mycotoxins was given to individual broilers and pigs, with and without a mycotoxin “detoxifier” product. The optimal biomarkers for aflatoxin B1 (AFB1), deoxynivalenol (DON) and ochratoxin A (OTA) in broilers was AFB1, OTA and DON-sulfate in both plasma and excreta. There was a significant reduction and faster decline in plasma biomarker values over time for DON-sulfate in birds given the detoxifier suggesting increased binding and decreased intestinal absorption of DON.

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Dr. Michael Lilburn, Nutrition Consultant

"New research results on blood biomarkers validate its benefits, providing broader insights into toxin exposure than traditional feed analysis. This technology, included in the Myco-Marker™ service, accurately reflects total mycotoxin exposure, including transformed metabolites like DON-sulfate."

For any new assay developed with advanced technology, there needs to be a logical transition from sample collection and analysis in a laboratory environment to the real world of commercial poultry production. In this regard, Lauwers et al. (2019 b) developed and validated a method using a drop of whole blood, collected and dried on filter paper, as the matrix from which to test for toxins and biomarkers. In conjunction with LC-MS/MS analysis, the authors were able to validate the method for the determination of 23 mycotoxins and their primary blood metabolites. The next step in the validation/applicability process was to directly correlate the data from plasma samples and their respective dried blood spots; this correlation between the two matrices was highly significant ($r > 0.95$). As noted by Lauwers et al. (2019 b), a dried blood spot on paper greatly facilitates collection, transport and storage of samples prior to analysis.

Detrimental Impact of Mycotoxins on Poultry Health

Mycotoxins are ubiquitous toxic metabolites produced by fungal species commonly found on the primary cereal grains used for poultry and swine diets, as well as co-products and preserved forages fed to ruminants. Their well-documented detrimental effects in poultry impact immune function, inflammation, liver health, oxidative status, gut health, and overall performance and efficiency. Traditionally, mycotoxin management programs have incorporated some degree of informed assessment of annual growing conditions and crop status prior to harvest combined with testing of individual cereal grains and/or finished feeds. However, this information has significant limitations due to sampling difficulty and testing protocols that only address a restricted number of toxins.

The fungal species Aspergillus (aflatoxins) and Fusarium (deoxynivalenol) are of primary concern, but the Alternaria species has recently gained increasing attention as the source of "emerging mycotoxins" (i.e. tenuazonic acid, alternariol). These particular toxins are not new, but are now routinely observed - a reflection of the significant advances in toxin detection technologies.

Fungal mycotoxins will be an ongoing concern for the poultry industry, with new challenges presented with each new harvest. The technologies for the detection of mycotoxins have greatly improved, but there has always been the missing link of post-absorptive, in vivo assessment of exposure and individual mitigation strategies.

We invite you to delve deeper into this critical topic by attending our presentation or visiting the Innovad booth A861 for insightful discussions on mycotoxin assessment and mitigation options.

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