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Fate of mycotoxins in laboratory scale bio-ethanol production systems

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Abstract Dried Distillers Grains with Solubles (DDGS) animal feed product is known to contain 3-5 times the concentration of some Fusarium toxins (e.g. DON) compared to the starting material. It is reported that masked mycotoxins are released through this process by action of glucosidase enzymes, although full mass balance to calculate conversion factors under different conditions are not yet established. Other toxins (enniatins, beauvericin) have not been studied through this process.



There are also reports of yeast converting some toxins to more toxic metabolites (e.g. zearalenone to zearalenols), nothing is known of yeast metabolism of enniatins/beauvericin.

A series of experiments varying conditions to mimic those used in bioethanol production will be conducted to establish the impact on mycotoxin concentrations and assess what toxins are concentrated in the final animal feed products and what toxins may be converted to different forms.

In the first instance wheat contaminated with significant levels of DON will be used as a model feedstock. Field plots of wheat will also be inoculated with known toxin producers (T2/HT2 toxin, beauvericin, enniatins, moniliformin) for subsequent experiments. The advantage of this approach is that it should ensure sufficient levels of toxins and other possible new conjugates will be present to allow mass balance studies to be conducted.

Analyses will be carried out using an LC-MS/MS multi-mycotoxin method capable of detection ~50 mycotoxins.

Other feedstocks with different toxin profiles could be studied through the model process to assess the effects and calculate the mass balance of other toxins, for example maize (fumonisins) and/or sorghum or rye (alternaria/ergot alkaloids).

Keywords masked mycotoxins;fusarium;DDGS;bio-ethanol;LC-MS/MS

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