Understanding and Coping with Effects of Mycotoxins in Livestock Feed

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Mycotoxins are toxic, secondary metabolic products of moulds. Despite different approaches to control fungal growth and subsequent mycotoxin contamination of grain these undesired compounds are formed under certain environmental conditions on the growing field plant (worldwide most important field fungi are *Fusarium sp.* and *Alternaria sp.*) as well as during storage (mainly by *Aspergillus sp.* and *Penicillium sp.*). Once produced it is very difficult to get rid of mycotoxins or even to reduce the contamination level as these toxins possess high physical and chemical stability.

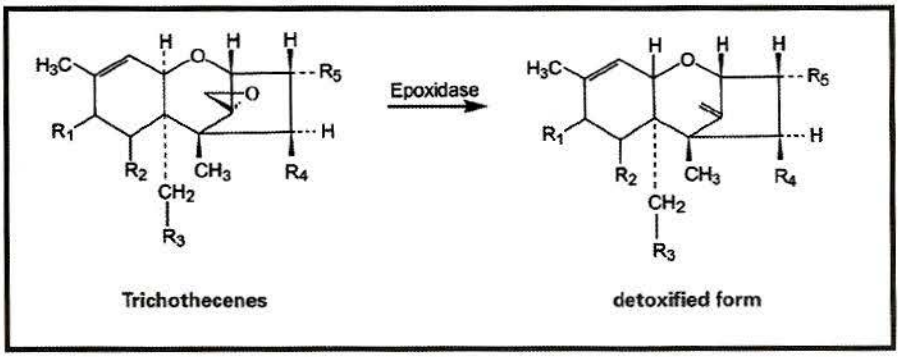
Mycotoxins can cause a wide variety of negative impacts on animal health, depending among various other factors on their nature and concentration. Especially chronic mycotoxicoses leading to unspecific symptoms often entail serious economic losses in animal production.

Up to now, hundreds of different mycotoxins are known, but agriculturally most important are aflatoxins, trichothecenes (e.g. DON, NIV, T-2 toxin, HT-2 toxin, DAS), zearalenone, ochratoxins A and fumonisins. Due to their structural, physical and chemical differences there is still no single approach to counteract all of them.

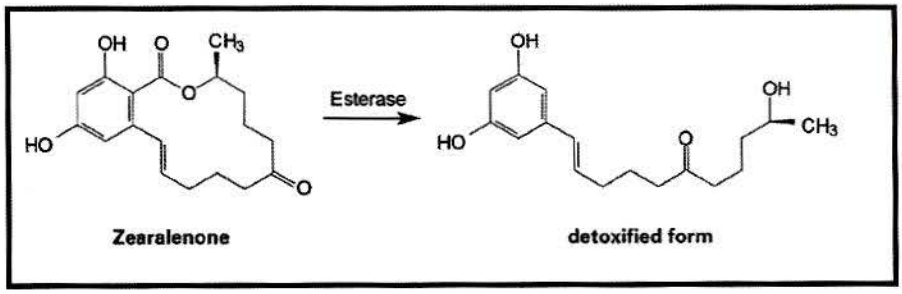
Successful measures with regard to mycotoxin-deactivation have to be based on mainly two different strategies: 1) elimination of toxin (adsorption) and 2) elimination of toxicity (biological detoxification).

Until now a lot of research has been conducted to adsorb mycotoxins during the digestive process of animals with products (mainly on aluminosilicate basis) directly mixed into feed. While good and scientifically explained results were obtained for counteracting aflatoxins (Ramos and Hernandez, 1996; Scott *et al.*, 1998), adsorption of other mycotoxins was limited (e.g. ZON) or even failed (e.g. trichothecenes) under field conditions (Friend *et al.*, 1984; Kubena *et al.*, 1990; Huff *et al.*, 1991; Kubena *et al.*, 1993; Ramos *et al.*, 1996).

Biological detoxification of mycotoxins by means of micro-organisms and/or enzymes has been subject of research for more than 30 years (Binder *et al.*, 2000; Kollarczik *et al.*, 1994; He *at al.*, 1992; Yoshizawa *et al.*, 1983 and 1984). By far the most investigated mycotoxins are members of the trichothecene family. Now it is known that their 12,13-epoxide ring is mainly responsible for their toxic activity and removal of this epoxide group entails a significant loss of toxicity.



Toxicity of zearalenone is based on its similarity to the female hormone estrogen. Hydrolysis of the toxin's ester group (i.e. opening of the lacton ring) by means of specific enzymes changes the mycotoxin's structure resulting in non-toxic and therefore harmless metabolites.



The presentation will introduce a product that by means of up to five modules combines both main strategies (i.e. adsorption and biological detoxification) to successfully counteract all agriculturally important mycotoxins including aflatoxins, trichothecenes, zearalenone, ochratoxin A and fumonisins.

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