EFFICACY OF SEQUESTRANT/CHELATOR AMADÉITE, IN THE BINDING OF MYCOTOXINS DURING TRANSIT THROUGH A DYNAMIC GASTROINTESTINAL MODEL (TIM) SIMULATING THE GI CONDITIONS OF PIGS.

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ABSTRACT

Objective

The objective of this study was to investigate the efficacy of a pillared interlayer clay Amadéite on the binding of various mycotoxins and consequently to inhibit the availability for absorption of mycotoxins during gastro-intestinal transit of the TNO in vitro dynamic gastrointestinal model, the TIM-1 system.

MATERIEL AND METHODS

The experiments in TIM-1 were performed under the average physiological conditions of the gastrointestinal tract of young adult pigs after the intake of a solid pig meal artificially contaminated with the mycotoxins deoxynivalenol (approx. 1 ppm), and fumonisin (approx. 2 ppm).

The feed and pooled dialysate samples were analysed on the concentrations of the two mycotoxins (DON, Fumonisin). The difference in absorbed amounts between the control experiment (0% level of adsorbent) and the experiments with 0.01% and 0.1% adsorbent added to the pig feed, determines the efficacy of the mycotoxin-binding in inhibiting mycotoxin absorption.

The feed and dialysate samples of each TIM-run are analysed on some specific nutrients:

- Nitrogen Kjehldahl analysis (to determine the protein digestibility);
- Free glucose; (to determine the carbohydrate digestibility);
- Vitamin B1 (thiamine) and B2 (flavine dinucleotide) (as example-vitamins to determine the bioaccessibility of water soluble vitamins).

The difference in absorbed amounts of nutrients between the control experiment (without adsorbent) and the experiments with two levels of adsorbent/chelator, determines the potential binding effect of the sequestrant on the feed nutrients.

RESULTS/CONCLUSION

The results showed that Amadéite has a binding capacity for fumonisin, even at the low dose of 0.01% in pig feed, contaminated with two different mycotoxins at the levels of 0.8 to 2 ppm. It

inhibits the bioaccessibility of fumonisin with approximately 50% (0.01% level of Amadéite) to 60% (0.1% level).

Besides fumonisin, Amadéite also inhibits the bioaccessibility of deoxynivalenol (DON). Added to the contaminated pig feed at the level of 0.1%, the inhibition was approximately 40% in comparison to the control without Amadéite.

Previous studies in the TIM system with activated carbon demonstrated a reduction in the bioaccessibility of DON of 30–40% in comparison to the control experiment (Avantaggiato et al., 2004). However, the level of activated carbon in the feed ranged from 0.5% up to 2%.

The absorbance capacity of Amadéite did not inhibit the digestibility of proteins and carbohydrates as shown by an unchanged bioaccessibility of nitrogen and glucose, respectively.

The addition of Amadéite to the pig feed at the level of 0.1% showed a 30% increase in the bioaccessibility of vitamin B1 in comparison to the control, but did not change the bioaccessibility of vitamin B2.