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THE INFLUENCE OF SURFACTANTS ON T-2 TOXIN ADSORPTION

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Among strategies developed to counteract the adverse effects of mycotoxin-contaminated feeds consumption, the use of “mycotoxin binders” is by far the most popular. However, their efficacy is not constant — numerous discrepancies between *in vitro* and *in vivo* efficacy, as well as between their ability to counteract the effects of chronic and acute mycotoxicoses are known. Also, binders that are effective against aflatoxicosis might appear ineffective against T-2 toxicosis (to which poultry is rather vulnerable). The influence of GIT conditions on mycotoxins adsorption is believed to be among the main reasons for the existence of above-mentioned discrepancies, but only acidity level is commonly simulated during *in vitro* testing of mycotoxin binders, in spite of the abundance of binders, which retain their activity towards mycotoxins under broad pH range.

Accordingly, investigation of the influence of GIT conditions (presence of amino acids, lipids, carbohydrates, bile acids, feed emulsifiers) on T-2 toxin adsorption is of interest.

Twelve binders were chosen on the basis of their relatively high activity towards T-2 toxin and zearalenone shown in previous work, and their ability to sequester T-2 toxin from water solutions of nutrients and surfactants was studied. Also, adsorption of surfactants and their influence on T-2 toxin extraction into chloroform was investigated.

Surfactants had a greater influence on adsorption than nutrients. For example, significant ($P < 0.05$) activity towards T-2 toxin was demonstrated by 11 of the chosen binders in water solution, by 6 in the solution of nutrients (>60 g/l in total), and only by 3 in the solution of a surfactant (tween 20; 0.5 %). The mean percent of adsorption amounted correspondingly 60→90, 28 and 15.

It was speculated, that such a strong influence of surfactants on T-2 toxin adsorption could be explained, firstly: by competitive adsorption, caused by their ability to concentrate on phase borders, and secondly: by an increase of T-2 toxin solubility in the presence of surfactants, caused by its micellar solubilization. In order to test these speculations, adsorption of surfactants and their influence on T-2 toxin extraction was investigated. It appeared that the majority of the binders actively sequestered surfactants — adsorption amounted up to 50 to ≥ 90 %, thus reaching 1/10 of a binder mass, which might support the suggestion about intensive competitive adsorption of surfactants. It also appeared that the presence of surfactant in solution caused an approximately 10-fold decrease of T-2 toxin extraction into chloroform.

Thus, both the surfactants competitive adsorption and the T-2 toxin solubilization could influence T-2 toxin adsorption. The simultaneous action of both these mechanisms, providing their Gibbs energy is no less than that of T-2 adsorption, might prevent the direct adsorption of T-2 toxin, while promoting it in the form of mixed micelles (the so-called adsolubilisation). Low specificity of such mechanism of T-2 toxin sequestration might explain the discrepancies between mycotoxin binders efficacy against chronic and acute T-2 toxicosis since the main components of bile — namely bile acids and phospholipids, are micelle-forming surfactants with a wide array of important functions.