Carry-over of deoxynivalenol and de-epoxy-deoxynivalenol into edible tissues, blood serum and bile fluid of growing bulls

Hana Valenta and Sven Dänicke

Institute of Animal Nutrition, Federal Agricultural Research Centre (FAL),
Bundesallee 50, D-38116 Braunschweig, Germany

1. Introduction

On the basis of studies to date, it is estimated that food of animal origin does not significantly contribute to human exposure to deoxynivalenol (DON). However, in case of ruminants, studies on carry-over of DON into edible tissues are scarce to date.

Therefore, the carry-over of DON and of the metabolite de-epoxy-deoxynivalenol (de-epoxy-DON) into edible tissues as well as into blood serum and bile fluid of growing bulls was examined within a feeding experiment with *Fusarium* contaminated wheat (10 mg DON per kg dry matter).

2. Materials and methods

2.1 Feeding experiment

Two groups of bulls (n = 14 per treatment) received concentrates on wheat basis with resulting DON concentrations per kg DM (dry matter) of 7.8 mg (DON group) and 0.06 mg (control group), respectively. Concentrate supply was restricted to 2.3 kg/d – 2.8 kg/d whereas maize silage (DON concentration: 0.4 mg/kg DM) was offered for ad libitum consumption. The feeding experiment covered the live weight range between 244 kg and 460 kg.

Ten animals of each group were slaughtered at the end of the experiment. Liver, kidney, muscle sample from *musculus longissimus dorsi*, back fat (sample of the corresponding subcutaneous fat), blood serum and bile fluid were taken of eight and four animals of the DON and control group, respectively, for mycotoxin analysis.

2.2 Mycotoxin analysis

DON and de-epoxy-DON were analysed using a previously described HPLC-UV method (Valenta et al., 2003) with modifications. All samples were incubated with ß-glucuronidase before extraction in order to cover glucuronide conjugates:

Liver, kidney and muscle: lyophilization, extraction with acetonitrile-water, purification with immunoaffinity columns (IAC) after a pre-cleaning step.

Fat: sample preparation according to muscle, but without lyophilization.

Blood serum and bile fluid: extraction with ethyl acetate on ChemElut® cartridges, purification with IAC.

Detection limits of both toxins: 4 ng/g in freeze-dried liver, kidney and muscle corresponding to approx. 1.5 ng/g in fresh samples, 4 ng/g in fresh fat, 2 ng/ml in serum and 4 ng/ml in bile fluid.

3. Results

Referring to the edible tissues, neither DON nor de-epoxy-DON could be detected in any of the muscle and fat samples. Very low concentrations of de-epoxy-DON below 10 ng/g (relating to freeze-dried samples) were found in four liver samples and three kidney samples of the toxin group. Only trace concentrations of de-epoxy-DON were measured in four serum samples of the toxin group, as well. In contrast to these results, de-epoxy-DON was detected in all bile samples of the toxin group (concentration range 8 – 40 ng/ml, mean value 24 ng/ml) and of the control group (range 7 – 17 ng/ml, mean value 12 ng/ml) (see Figure).

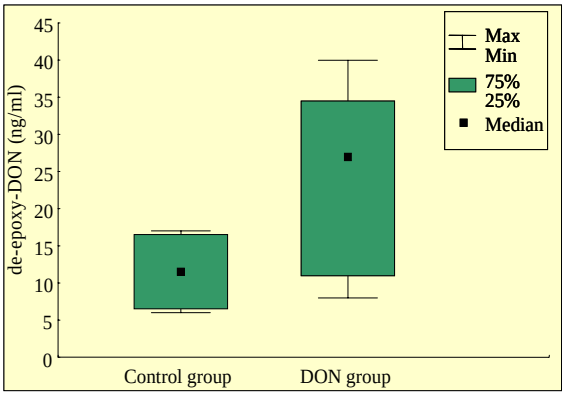

Figure: De-epoxy-DON concentration in bile fluid

For confirmation, it is intended to re-analyse the bile samples with LC/MS/MS.

4. Conclusions

The results show that the significance of carry-over of DON into edible tissues of bulls is very low. Moreover, only the far less toxic metabolite de-epoxy-DON which is formed in the rumen was detected.

5. References

Valenta, H., Dänicke, S. and Döll, S., Mycotox. Res. 19, 2003, 51-55