Impact of deoxynivalenol on oral bioavailability of fumonisins in broilers

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Due to their polar properties the oral bioavailability of fumonisins is generally low. For fumonisin B1 (FB1) in laying hens it is estimated around 1-2%. Fumonisins frequently co-occur in animal feed with the trichothecene deoxynivalenol (DON). The objective of this study was to evaluate whether a chronic exposure to DON affects the oral bioavailability of fumonisins in broiler chickens.

Twelve one-day-old Ross 308 broilers were randomly divided into two groups of 6 birds. Throughout the three week experiment one group received a mycotoxin blank diet, while the other group received a diet experimentally contaminated with DON. Concentrations in the feed were determined using a validated LC-MS/MS method (Monbaliu et al., 2010). The contaminated feed contained DON at respectively 3113 ± 900 µg/kg for the starter feed, 2884 ± 800 µg/kg for the grower feed and 3351 ± 1000 µg/kg for the finisher feed. At day 21 all birds received an intra-crop bolus of fumonisins (2.5 mg/kg BW; consisting of 1.91 mg FB1/kg BW and 0.59 mg FB2/kg BW). This concentration was extrapolated from the European guidance level (20,000 µg FB1+FB2/kg feed) and the expected chicken feed intake. Subsequently, blood was withdrawn at several time points after fumonisin administration. Plasma concentrations of FB1, DON and DOM-1 were determined using a validated LC-MS/MS method (Devreese et al., 2012).

No DON nor FB1 and FB2 could be detected in the blank diet above the limit of quantification (LOQ). No differences could be detected in the toxicokinetics of fumonisins between chickens receiving blank and DON contaminated diet (P>0.05). Maximal plasma concentration for FB1 was respectively 37.3 ± 30.0 and 40.3 ± 28.8 ng/ml; time to Cmax was respectively 15.0 ± 5.8 and 15.0 ± 5.5 minutes and area under the plasma concentration-time curve (AUC0–240min) respectively 1717.8 ± 1102.1 and 1818.3 ± 489.3 ng.min/ml. No DON or DOM-1 plasma levels above LOQ were observed in both groups.

In conclusion, chronic exposure to DON does not influence the oral resorption of fumonisins in broilers.

References

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