INCIDENCE OF CITRININ IN THE BELGIAN FEED CHAIN AND ITS TOXICOKINETIC PROFILE IN BROILER CHICKENS

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INTRODUCTION

- A scientific opinion on CITRININ (CIT) published by EFSA emphasized that:
  - additional quantitative occurrence and toxicity data is needed;
  - the impact of uncertainties on the risk assessment is large;
  - more data regarding the toxicity and the occurrence of CIT in food and feed are needed to enable refinement.
- In Belgium, a risk assessment will be performed in order to set legal limits for this toxin, by using collected occurrence and toxicity data of CIT.

OBJECTIVES

- To collect occurrence data of CIT in feed in Belgium
  - an LC-MS/MS method was developed for analysis of CIT in feed (pig and chicken);
  - this validated method was applied on 90 Belgian feedstuffs.
- To collect toxicokinetic data of CIT and its metabolite dihydrocinchonine (HO-CIT) in broiler chickens
  - an LC-MS/MS method was developed for analysis of CIT and HO-CIT in chicken plasma;
  - a pilot toxicokinetic study was performed on 1 broiler chicken.

MATERIALS AND METHODS

FEED

A total of 90 feed samples (broiler chicken and pig feed) were obtained from different Belgian feed producing companies from March 2017 until June 2017.

CHICKEN PLASMA

A dose of 0.25 mg/kg body weight of CIT (in physiological saline) was administered intravenously to 1 broiler chicken (Ross 308, 4 weeks old,♂). Blood (200 µL, 1 eg vein) was collected at 0, 0.08, 0.16, 0.33, 0.66, 0.75, 1, 2, 3, 4, 6, 24, 48 and 72 h after administration. The trial was approved by the Ethical Committee of the Faculties of Bioscience Engineering and Veterinary Medicine from Ghent University (case no. EC 2017/105).

RESULTS

Table 1. Method performance parameters of the developed LC-MS/MS method for analysis of CIT/HO-CIT in animal feed and chicken plasma.

Feeding | CHICKEN PLASMA
---|---
Range | CIT | HO-CIT
Apparent recovery | 100-110% | 80-107%
RSD<sub>x</sub> | <20 % | <20 %
LOQ | 0.05 µg/L | 0.05 µg/L
LOD | 0.5 µg/L | 0.1 µg/L

Fig 1. Overview sample preparation for extraction of CIT in feed and chicken plasma

Table 2. Occurrence of CIT in Belgian chicken and pig feed. Concentrations are shown with respect to their measurement uncertainty. *“of samples above LOD (0.1 µg/kg).

Table 3. Comparison of toxicokinetic parameters of CIT and QTA after intravenous administration of 0.25 mg CIT (kg body weight to broiler chicken (♂)). The inserts are the chemical structures of (A) CIT and (B) HO-CIT.

CONCLUSIONS AND FURTHER RESEARCH

- CIT frequently occurs in Belgian feed, although in low concentration levels
- Limited data is available concerning its toxicity and toxicokinetics
- Hence, further research is needed.

The research was funded by the Belgian Federal Public Service of Health, Food Chain Safety and Environment through the contract BT16530B CITRINISK.

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