Abstract

T-2 toxin and zearalenone (ZEN) are mycotoxins produced by a large group of moulds from the genera Fusarium, Myrothecium, Spicellum, Stachybotrys, Cephalosporium and Trichoderma. Classified as group A trichothecenes, T-2 toxin is one of the most potent cytotoxic mycotoxins. ZEN is both a mycotoxin and a xenoestrogen. Due to a molecular structure similar to 17ß-estradiol, ZEN has an affinity for oestrogen receptors. This generates a number of reproductive system disorders, but not only, as immunocompetent cells also contain oestrogen receptors. The main vector carrying T-2 toxin and ZEN is mould-infested cereals. T-2 toxin and ZEN toxin show high stability to high temperatures and pressure, which makes their inactivation almost impossible. Research to date has provided insight into the health effects of exposure of livestock to high concentrations of T-2 and ZEN toxin. However, there are still few data that describe the effects of simultaneous exposure to T-2 toxin and ZEN at low concentrations.

Considering the possibility that both mycotoxins may occur simultaneously in feedstuffs, a study was undertaken to evaluate the effects of simultaneous oral exposure to low concentrations of T-2 toxin (14.5 µg/kg b.w./day; 50% LOAEL dose) and ZEN (10 µg/kg b.w./day; NOAEL dose) on selected immune parameters of the pig hindgut immune system. The experiment was conducted over a period of 14, 28 and 42 days. The aim of the study was firstly to determine whether T-2 toxin and ZEN affect the course of the developing food tolerance in gilts by assessing the concentrations of pro-inflammatory cytokines (IFN-γ, IL-1β, IL-2, IL-12/23p40), anti-inflammatory and regulatory cytokines (IL-4, IL-10, TGFβ), the percentage of T CD2+, T CD4+, T CD8+, T CD4+CD8+, Tγδ, TCR αß+, NK, B CD5+(B1) and B CD21+ (B2) lymphocyte subpopulations. Secondly, what effect do T-2 toxin and ZEN have on the cellular response associated with CD8+ (Tc) T cells and IFN-γ, and the humoral/regulatory response associated with CD21+ (B2) B cells and IL-4.

In addition to a decrease in TGFβ, the experimental animal group showed an increase in all cytokines, both pro-inflammatory and anti-inflammatory/regulatory. There was an increase in the percentage of CD2+ T lymphocytes, CD8+ Tc lymphocytes and CD5+ B lymphocytes (B1) and a decrease in the percentage of CD21+(B2) B lymphocytes and Tγδ TCR+ lymphocytes. The nature of the observed changes in cytokine concentrations within the tested areas of the hindgut wall are indicative of the development of inflammation, which may contribute to increased intestinal barrier permeability and impaired

gastrointestinal tolerance. The profile of observed changes in the percentage of CD2+ T-lymphocyte subpopulations, CD4+ T-lymphocyte subpopulations, CD8+ T-lymphocyte subpopulations, γδ+ T-lymphocyte subpopulations, TCR αß+ T-lymphocyte subpopulations, NK lymphocyte subpopulations, B CD5+ (B1) and B CD21+ (B2) lymphocyte subpopulations and a decrease in the percentage of B CD21+(B2) lymphocyte subpopulations are indicative of an enhanced cellular response.

Based on the results, it can be concluded that exposure of gilts to T-2 toxin at a dose of 14.5 μg/kg b.w./day (50% of the LOAEL) and ZEN at a dose of 10 μg/kg b.w./day (NOAEL dose) administered concurrently for at least 14 days negatively affects the immune function of the pig hindgut. Exposure to T-2 toxin and ZEN triggers inflammation, enhances the cellular response, may cause an increase in the permeability of the intestinal wall and may be a factor in the formation of food tolerance in the pig hindgut.