Effects of Feed-Borne *Fusarium* Mycotoxins on Hematology and Immunology of Laying Hens

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ABSTRACT

Feeding grains naturally contaminated with *Fusarium* mycotoxins has been shown to alter metabolism and performance of laying hens. The objectives of the current experiment were to examine the effects of feeding grains naturally contaminated with *Fusarium* mycotoxins on hematology and immunological indices and functions of laying hens and the possible protective effect of feeding a polymeric glucomannan mycotoxin adsorbent (GMA). One hundred forty-four laying hens were fed for 12 wk with diets formulated with (1) uncontaminated grains, (2) contaminated grains, or (3) contaminated grains + 0.2% GMA. *Fusarium* mycotoxins such as deoxynivalenol (DON, 12 mg/kg), 15-acetyl-DON (0.5 mg/kg), and zearalenone (0.6 mg/kg) were identified in the contaminated diets arising from contaminated grains grown in Ontario, Canada. The concentrations of DON arising from naturally contaminated grains in this study were similar to purified mycotoxin fed to experimental mice. The chronic feeding of *Fusarium* mycotoxins induced small decreases in hematocrit values, total numbers of white blood cells, lymphocytes including both $CD4^+$ and $CD8^+$ T lymphocytes and B lymphocytes, and biliary IgA concentration. Supplementation of diets containing feedborne mycotoxins with GMA prevented the reduction in total number of B lymphocytes in the peripheral blood and the reduction in biliary IgA concentration. In addition, the delayed-type hypersensitivity response to dinitrochlorobenzene was increased by feed-borne mycotoxins, whereas IgG and IgM antibody titers to sheep red blood cells were not affected by diet. We concluded that chronic consumption of grains naturally contaminated with *Fusarium* mycotoxins at levels likely to be encountered in practice were not systemically immunosuppressive or hematotoxic; however, mucosal immunocompetence needs to be explored further.

(*Key words*: *Fusarium* mycotoxin, hematology, antibody-mediated immune response, cell-mediated immune response, biliary immunoglobulin A)

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Abbreviation Key: DNCB = dinitrochlorobenzene; DON = deoxynivalenol; DTH = delayed-type hypersensitivity; GMA = glucomannan mycotoxin adsorbent; Hb = hemoglobin; HRP = horseradish peroxidase; RPE = R-phycoerythrin; ZEN = zearalenone.