Effect of whole wheat feeding on selected immune parameters in growing male turkeys

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Abstract

The objective of this study was to determine the effect of whole wheat feeding on selected parameters of humoral and cell-mediated immunity in growing turkeys. A total of 210 one-day-old heavy-type Hybrid Converter male turkeys were randomly divided into three different dietary treatment groups, each consisting of 7 replicate pens of 10 birds per pen. Until 4 wk of age, all birds were fed a commercial diet formulated to meet nutrient requirements. From 5 to 12 wk of age, diets were composed of wheat (ground-pelleted or whole grain) and protein-fat-mineral-vitamin concentrate. The total wheat concentration in diets was 500 or 600 g/kg in the feeding periods of 5-8 and 9-12 wk of birds' age, respectively. Whole grain wheat had a 0, 50 or 100% share of the total wheat amount in the daily ration in treatment groups W₀, W₅₀ or W₁₀₀, respectively. Commercial vaccines against ND (Newcastle disease) and TRT (Turkey rhinotracheitis) were administered to turkeys via the drinking water on days 20 and 30, respectively. Over the entire experiment, a significant linear decrease was observed in body weight gains (BWG) with increasing dietary levels of whole grain wheat. As a result the BWG of control turkeys (W₀) were significantly higher than the BWG of group W₁₀₀ birds (P = 0.002). A significant linear increase in feed conversion ratio (FCR) was observed with increasing dietary levels of whole grain wheat (P < 0.001). The levels of antibodies against TRT and ND viruses after immunization were significantly higher in both the W₅₀ and W₁₀₀ group, in comparison to group W₀ (P = 0.006 and P = 0.001, respectively).

Turkeys from group W₅₀, in comparison to those from groups W₀ and W₁₀₀, had a significantly higher percentage of CD⁴⁺ T cell subpopulation within the lymphocytes isolated from blood and ileal mucosa, as well as CD⁴⁺ CD⁸⁺ and CD⁸⁺ T cell subpopulations within the blood immunocompetent cells (P = 0.022, P = 0.029, P = 0.009 and P = 0.011, respectively). In the cecal tonsils, the percentage of CD⁸⁺ T cell subpopulation was significantly lower in group W₅₀ than in groups W₀ and W₁₀₀ (P = 0.014). The results of our study indicate that diluting diets with whole grain wheat stimulates the non-specific cell-mediated defense mechanisms of the gastrointestinal immune system in turkeys, thus positively affecting humoral response after vaccination.

Key words: whole wheat, growth performance, turkeys, cell-mediated immunity, humoral response

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