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**The effects of dietary supplementation with levan on the intestinal morphology and specific immune cell composition in the lymphoid tissues of laying hens**

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**Abstract:**

**Background/Objective:** In birds, optimal intestinal development is important for effective nutrient absorption and maintaining high disease resistance. The present study aimed to determine the number of Bu-1, CD4, and CD8α positive cells in spleen and cecal tonsils, as well as histomorphometric parameters of intestinal villi in laying hens fed diet supplemented with different doses of levan, which is not digested in the small intestine and therefore can be considered prebiotic.

**Methods:** The feeding experiment was conducted 90 days on 120 laying hens from Lohmann Brown line. Birds were kept in the battery cage system and fed either a basal diet – control group (C); L0.1, L0.25, L0.5 and L1 - the basal diet with 0.1%, 0.25%, 0.50% or 1% of levan, respectively. The samples were collected from 8 bird/group at the end of experiment. The proportions of Bu-1, CD4, and CD8α were counted and histomorphometric parameters of intestinal villi were measured.

**Results:** The ratio of CD4+/CD8α+ lymphocytes in the spleen was the highest in the L0.25 group. In the cecal tonsils the number of Bu-1+ cells increased in L0.5 group compared to the C group. In the gut, a significant effect of levan was observed at concentrations starting from 0.25% upward. The greatest changes were noted in the duodenum, where an increase in the depth of the crypts and a decrease in the ratio of the length of the villi to the depth of the crypts were observed.

**Conclusion:** The above results indicate that both cell turnover and mucosal secretion are high. The results also show that the levan may presents potential immunomodulatory properties in laying hens nutrition.

**Keywords:** laying hens, levan, morphology

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