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The Thesis Submitted for the Degree of DVM

**Study of the effect of different levels of apple cider vinegar
in the diet on some liver enzymes and histopathology of
intestine in broiler chickens**

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Abstract:

Background: Due to the importance of poultry industry and due to the prevalence of antibiotic resistance, feed additives have recently replaced antibiotics to increase growth and food efficiency. Apple cider vinegar, which is obtained from apple fermentation, contains a variety of flavonoids and organic acids and it has antioxidant, antibacterial and antifungal properties. Researches has shown that the use of organic acids can improve digestion and absorption of feed, reduce the production of toxic substances, strengthen the immune system and increase the height of intestinal villi in poultry.

Objective: The purpose of this research is to evaluate the effects of using apple cider vinegar in the diet on liver enzymes and histopathology of small intestine in broiler chickens.

Materials and Methods: A total of 64 broiler chickens of Ross 308 were randomly selected and tested. Chicks were divided into four experimental groups with 4 replications and 4 chickens in each replicate. The diets of groups 2, 3 and 4 were mixed with 1, 2 and 3% apple cider vinegar containing 5% acetic acid, respectively, and were used from one-day age and group 1 was fed as a control group with normal diet. On 14th and 28th, one chicken from each replication was randomly selected and subjected to necropsy and sampling. Blood was taken from the wings vein. Then, liver enzymes and some blood factors of chickens serum were evaluated using Auto Analyzer and Kit. After necropsy, the weight of the bursa of Fabricius, small intestine, spleen and liver and the length of the small intestine were measured. To observe intestinal histopathological changes, tissue samples were prepared from the jejunum part of the small intestine. And the data were analyzed by SPSS software

Results and Discussion: According to the obtained results, there were no significant changes in the level of liver enzymes Alkaline Phosphatase (ALP) and Aspartate Aminotransferase (AST), total protein and blood albumin between the groups treated with apple cider vinegar and the control group. But a significant decrease in Alanine Aminotransferase (ALT) enzyme level was observed in groups 3 and 4 compared to the control group; The histopathology results of the small intestine showed an increase in the height of intestinal villi, the depth of Lieberkohn's crypts and the number of intestinal villi in the groups receiving apple cider vinegar (groups 2, 3 and 4). It was also observed that the increase in body weight in the groups that were fed with apple vinegar is more than the control group. It seems that some component of apple cider vinegar, especially flavonoids, can protect the liver against damage caused by liver toxins and free radicals and reduce some liver enzymes

Keywords: apple cider vinegar, liver enzymes, broilers, small intestine histopathology