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The effect of feeding broilers with the encapsulated form of different levels of garlic and cumin essential oils on growth performance, blood parameters and intestinal morphology

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Abstract

The aim of this study was to compare the nutritional effects of different levels of cumin and garlic essential oil (normally and encapsulated), probiotics, chitosan with antibiotics on performance, immune responses, blood parameters and intestinal microbial population in broilers. A completely randomized design with 480 chickens including 12 experimental treatments with 4 replications (10 birds per replication) were used. Twelve treatments of this experiment was included; 1) Control treatment (without additives), 2) Flavophospholipol antibiotics (0.02%), 3) Probiotics, 4) Chitosan (200 mg / kg), 5 and 6) Garlic essential oil (at two levels of 100 and 200 mg / kg), 7 and 8) cumin essential oil (at two levels of 100 and 200 mg / kg), 9 and 10) encapsulated garlic essential oil (at two levels of 100 and 200 mg / kg), 11 and 12) essential oil Cumin is encapsulated (at two levels of 100 and 200 mg / kg). Experimental diets are based on corn and soybean meal and the nutrient level of the diets was adjusted according to the recommendation of Ross 308 broiler feeding guide. Data analysis was performed in two experiments, one for garlic and the other for cumin in comparison with other treatments.

Using the level of 100 mg / kg capsuleted form of garlic essential oil was able to increase body weight and reduced the feed conversion ratio ($P < 0.05$). The level of 100 mg / kg of capsuleted form of garlic essential oil was able to increase the villus surface area and the villus height to depth ratio of crypt ($P < 0.05$). Addition of 100 mg / kg garlic essential oil to diet reduced heterophil count and heterophile to lymphocyte ratio and also reduced concentration of glyceride and low density lipoproteins ($P < 0.05$). Addition of 100 mg / kg capsuleted form of garlic essential oil decreased blood lipid concentration ($P < 0.05$), increased the population of beneficial bacteria and population and reduced the *E.coli* population ($P < 0.05$). Cumin essential oil in both concentrations and forms was able to increase the population of beneficial bacteria and reduce E. coli population ($P < 0.05$). Dietary inclusion of encapsulated form of cumin essential oil at a concentration of 200 mg was able to increase the villus surface area and the

ratio of villus height to crypt depth (P <0.05). The capsulated form of cumin essential oil decreased heterophils, increased lymphocytes and decreased the ratio of heterophils to lymphocytes (P <0.05). Finally, the use of 100 mg / kg encapsulated form of garlic essential oil and 100 or 200 mg/kg of diet encapsulated form of cumin essential oil levels are recommended to improve the performance, immunity and characteristics of the gastrointestinal tract.
Keywords: Garlic Essential Oil, Cumin Essential Oil, Performance, Immunity, Gastrointestinal and Encapsulation