

# Effects of Water Supplementation with Oregano Essential Oil or a Mixture of Organic Acids and Cinnamaldehyde on Growth Performance, Chemical Composition Lipid Oxidative Stability and Microbiological Status of Chicken Meat - Abstract

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## Summary

The aim of this experimental study was to investigate the effects of drinking water supplementation with oregano essential oil and a mixture of a liquid product containing glycerol, monopropylene glycol, formic acid, propionic acid, lactic acid, sodium formate and cinnamaldehyde on broiler chickens. Sixteen thousand one-day-old broiler chicks (Ross-308) were allocated into two treatments. Control treatment was fed commercial diets (starter, grower, prefinisher, finisher) based on corn and soybean meal and drinking water ad libitum. OREG-ACIDS treatment was fed the same diets, however for the first 3 weeks of rearing the drinking water of the birds was supplemented (Dosatron automated system) with a liquid product containing 5% oregano essential oil (RIGOSOL™) at the level of 1 ml/lt, as well as for the final three weeks of rearing a mixture of glycerol, monopropylene glycol, formic acid, propionic acid, lactic acid, sodium formate, and cinnamaldehyde, at the level of 1ml/lt. All birds were reared for 42 days in a commercial farm (Rodotopi, Ioannina, Greece) during November and December of 2019. At the end of the trial, all birds were slaughtered under commercial conditions, their carcasses were processed, and 24 samples were taken from each group and kept at -4 °C for further analysis. Chicken breast and thigh meat were analyzed both by infrared technology (FoodScan™ Lab, FOSS Denmark) and wet chemistry methods, for moisture (gravimetric), fat (ether extraction), protein (Kjeldahl) and ash content (gravimetric). Moreover, lipid oxidation determined as malondialdehyde (MDA) was measured in breast and thigh meat stored at 4°C for 1 and 5 days. Microbiological quality of breast and thigh meat was determined by conventional microbiological techniques for total viable counts, lactic acid bacteria and Enterobacteriaceae. Statistical analysis was performed by one-way analysis of variance using the IBM SPSS Statistics (v20) statistical package. Tukey's range test

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was used, with differences considered to be significant at  $P < 0.05$ . OREG-ACIDS treatment had improved ( $P < 0.05$ ) average daily growth (63.3 g vs 60.7 g), final body weight (2.660 g vs 2.549 g), feed conversion ratio (1.54 vs 1.74), and mortality rate (3,10% vs 5,52%). Both oregano essential and the acid mixture showed excellent palatability and did not affect negatively feed intake. The meat chemical analysis revealed no differences ( $P > 0.05$ ) on moisture, fat and protein content (percentage %) of breast or thigh meat from the two experimental groups. Meat MDA determination showed that the OREG-ACIDS treatment had significantly ( $P < 0.05$ ) lower values in both breast and thigh meat on day 1 and after 4 days of refrigeration compared to the control treatment. OREG-ACIDS group had significantly ( $P < 0.05$ ) lower total viable counts and *Enterobacteriaceae* counts compared to control breast and thigh meat. Based on the trial results, the combined supplementation of oregano essential oils and organic acids mixture assisted the broiler chickens' performance and wellbeing. Further studies on intestinal microflora and morphometry could elucidate the potential effects of the examined substances, as well as the possible underlying synergistic mechanisms.

**Keywords:** Aromatic plants; broiler chicken; essential oils; organic acids; performance; meat composition.

**JEL Codes:** N50; Q10; Q13.

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