

## Properties and application of lavender essential oil in poultry production

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### ABSTRACT

Broiler chickens currently used in poultry production are characterized by a very fast growth rate and, at the same time, higher susceptibility to various types of health disorders, which often leads to diseases. Increasing attention is paid to natural plant products that can be used as phytobiotic additives due to the fact that modern methods of poultry rearing are aimed at limiting the use of synthetic additives. Synthetic substances are characterized by many side effects and are less effective in the treatment of bacterial infections. The reduced effectiveness is related to the emergence of antibiotic-resistant strains, therefore it is advisable to search for natural substances with antimicrobial activity.

The aim of the study was to determine the effect of lavender essential oil – **LEO** (*Lavandula angustifolia*) on production characteristics, ileum microflora composition and selected blood biochemical, immunological and antioxidant indices of broiler chickens, as well as to evaluate its *in vitro* effect in combination with gentamicin and enrofloxacin on selected bacterial strains. A total of three experiments were conducted with the use of lavender oil as an additive to drinking water for broiler chickens. Each experiment was carried out using 300 unsexed Ross 308 broiler chickens. One-day-old chicks were assigned to three experimental groups of 100 animals each. Chickens in the control group received drinking water without the addition of lavender essential oil throughout the rearing period. In the experimental groups, lavender oil was added to drinking water at different concentrations and for different time periods.

In the first experiment, lavender oil was applied in a concentration of 0.2 and 0.4 mL/L. In experiments 2 and 3, a concentration of 0.4 mL/L was used, from day 1 to 42 in the LEO<sub>1-42</sub> group, and from day 22 to 42 in the LEO<sub>22-42</sub> group. During the experiments, chicken body weight, feed and water consumption were determined, and deaths and culls were recorded. On the 42nd day of life, blood samples were collected from the chickens, which were used to determine selected biochemical (alkaline phosphatase – ALP, alanine aminotransferase – ALT, aspartate aminotransferase – AST, cholesterol, glucose, total protein, triglyceride and uric acid), immunological (IgA, IgG and IgM isotypes) and antioxidant (total antioxidant status – TAS) indices. The effect of the combination of lavender oil with enrofloxacin and gentamicin was tested using the checkerboard method.

The results showed that the addition of lavender oil to drinking water for broiler chickens had a positive effect on final body weight of chickens and FCR ( $p < 0.01$ ).

However, there were no differences between the groups in terms of feed and water consumption, survival, and biochemical and immunological blood indices ( $p > 0.05$ ). Lavender oil was demonstrated to increase total antioxidant status of blood serum ( $p < 0.01$ ).

The analysis of iliac intestine content composition showed that the abundance of individual groups of microorganisms, except for *Escherichia coli*, coliforms and probiotic bacteria, in chickens receiving lavender oil was comparable to the values obtained in the control group. It was shown that lavender oil exhibited properties modifying the gastrointestinal tract microflora in relation to *Escherichia coli* and coliforms ( $p < 0.01$ ). The presence of anaerobic bacilli from the *Clostridium* sp. group was not detected in any sample.

In turn, the analysis of the effect of lavender oil in combination with enrofloxacin and gentamicin demonstrated two types of interactions: synergistic or additive. The synergistic effect was found in the combination of lavender oil with enrofloxacin against antibiotic-resistant *Escherichia coli* strains (FICI index: 0.22 – 0.50) and gentamicin against *Staphylococcus aureus* strains (FICI index: 0.14 – 0.19).

04.06.2021.

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