



Comprehensive effect of essential oils on viral disease control in poultry farming

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Abstract

Viral diseases that affect the respiratory system of poultry, such as Avian Infectious Bronchitis (IBV), Newcastle Disease (ND), and Avian Influenza (IFV), have a significant and detrimental impact on the health of the animals. This, in turn, has negative consequences for the profitability of poultry producers. To control these types of diseases, the poultry industry has primarily relied on strengthening biosecurity plans, along with the implementation of various vaccination strategies. However, despite all the efforts made for their Control, viral diseases continue to be a major challenge to the profitability of poultry production. In this regard, the search for new alternatives that complement comprehensive strategies for controlling viral diseases has become necessary. In recent years, using natural compounds, especially essential oils (EOs), has demonstrated the ability to contribute at different stages of viral disease control. Therefore, it has become essential to delve into the application of these potential antiviral compounds, with the aim of using them in prevention, controlling infected animals, or reducing viral loads in the environment. This serves as an alternative or complement to the biosecurity and vaccination plans employed by poultry companies. This study aimed to delve into the comprehensive effects of EOs on viral diseases, considering their antiviral activity, modulation of the immune system, and potential to enhance biosecurity measures. It was achieved by compiling various unpublished studies conducted between 2014 and 2023 as part of the innovation processes of the research and development group at Promitec Santander (Colombia). The study key results are; (i) Antiviral Properties: The use of Eos demonstrated protective effects against embryonic death in eggs inoculated with NDV or IBV when these viruses were pre-incubated with EOs. Subsequently, plaque assay experiments revealed that EO blends had the ability to inhibit the production of infectious viral particles of SARS-CoV-2 by between 45% and 98%. (ii) Immunomodulatory Effects: Through *in-vitro* and *in-vivo* studies, it was observed that EOs had the ability to increase the gene expression of cellular virus recognition receptors and some antiviral effector proteins in animals both without viral challenges and in the presence of NDV and IBV vaccine strains. Finally, the talk will discuss potential avenues for further research and development in this field. Regarding prospects and opportunities, there are significant possibilities for the use of EOs as part of complementary strategies in virus disease prevention, Control of infected animals, and inactivation in the environment. However, ongoing research is necessary to investigate antiviral mechanisms of action and conduct *in-vivo* and field tests against the avian influenza virus H5N1.

Keywords: Essential oils, Avian influenza, Poultry farming, Antivirals, Immunomodulation, Biosecurity, Economic viability

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