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FULL LENGTH ARTICLE

Immune-responsiveness and performance of broiler chickens fed black cumin (*Nigella Sativa* L.) powder

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Abstract The main objective of this study was to determine the effects of various levels of dietary black cumin seed (BCS) on immune-responsiveness, broiler performance and lymphoid organs' ratio scores against NDV, IBV and IBDV vaccines. One hundred and sixty-one day-old broiler chicks (Rose 308) were randomly assigned into five groups with three replicates of seven birds each (21 chicks per group) and fed diets supplemented with 0.7%, 1.4%, 2.1% or 2.8% black cumin. All chickens were bled weekly for 35 days post-treatment. Body weights, thymus, bursa and spleen ratio scores were determined at 21 and 35 days while body weight was determined weekly. The results revealed non-significant differences in body weight between all groups compared to the control group. Antibody titers against NDV also exhibited non-significant differences at third, fifth and sixth weeks of the experiment between treated groups while they were significantly different from the control group. At the fourth week, group C showed significantly different antibody titers from other treated groups. However, antibody titers against IBV were significantly different in the fifth and sixth weeks against the control group. Similar results were recorded with IBDV vaccine compared to the control group while group C had significant differences in titers at 4, 5 and 6 weeks post-vaccination. Lymphoid organs, namely thymus, bursa and spleen showed non-significant differences between groups. This study showed that dietary supplement of black cumin seed at the level of 1% or 1.4% would enhance immune responsiveness in broiler chickens.

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1. Introduction

Antibacterial feed additives have been used in the poultry industry for many years to improve the productivity in terms

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of weight gain and feed conversion ratio by helping to control infections in the gut mucosa. However, antibacterial additives were banned throughout the world from being used in animal and poultry feeds since resistance to these antibacterial agents was recorded with most of them (Wegener et al., 1998; Shea, 2003). Antimicrobial agents of plant origin such as essential oils, plants extracts and complete plant substances, have gathered significant consciousness as alternatives to the traditional antibacterial feed additives. On the other hand, feed antibiotics, which have been used for promoting growth in farm animals were shown to negatively affect profitability of the

animals. Currently, the feed industry is researching various substitutes for antibiotics (Hertrampf, 2001; Humphrey et al., 2002). Black cumin (*Nigella sativa* L.), also known as black seed and grown in Asian and Mediterranean countries, is one of such alternatives that could be used as feed additives. A few studies showed that black cumin has antibacterial activity, indicating that it could be a substitute for conventional antimicrobial drug (El-Kamali et al., 1998; Mouhajir et al., 1999; Nair et al., 2005). (see Figs. 1 and 2)

The seeds of *N. sativa* L. have been used for centuries in the Middle East, Northern Africa, Far East, and Asia for the treatment of asthma (El-Tahir et al., 1993) and as an antitumor agent (El-Daly, 1998). In addition, the seeds have been reported to have many other biological properties including anti-parasitic (Mahmoud et al., 2002), anti-diabetic (Al-Hader et al., 1993), and diuretic effects (Zaoui et al., 2000).

The effects of dietary black cumin or oils on the performance of poultry were studied and it was determined that black cumin and its oil extract affected feed intake and BW positively in the broilers (Halle et al., 1999; Guler et al., 2006; Ziad and Mohammad, 2008; Erener et al., 2010). Some authors showed that diets supplemented with 10% black cumin seed had no adverse effects on performance (Al-Homidan et al., 2002). Other studies indicated that the addition of ground black cumin seeds (BCS) in concentrations less than 0.25 up to 0.75% and 1% or 2% of the diet had undesirable effects on performance and carcass quality (Abbas and Ahmed, 2010; Majeed et al., 2010; Nasir and Grashorn, 2010). The seed was shown to be effective against total coliform count in the intestine of broilers (Erener et al., 2010). Oil extracted of BCS was shown to effectively inhibit *L. monocytogenes* (Nair et al., 2005; Arici et al., 2005; Ali et al., 2007).

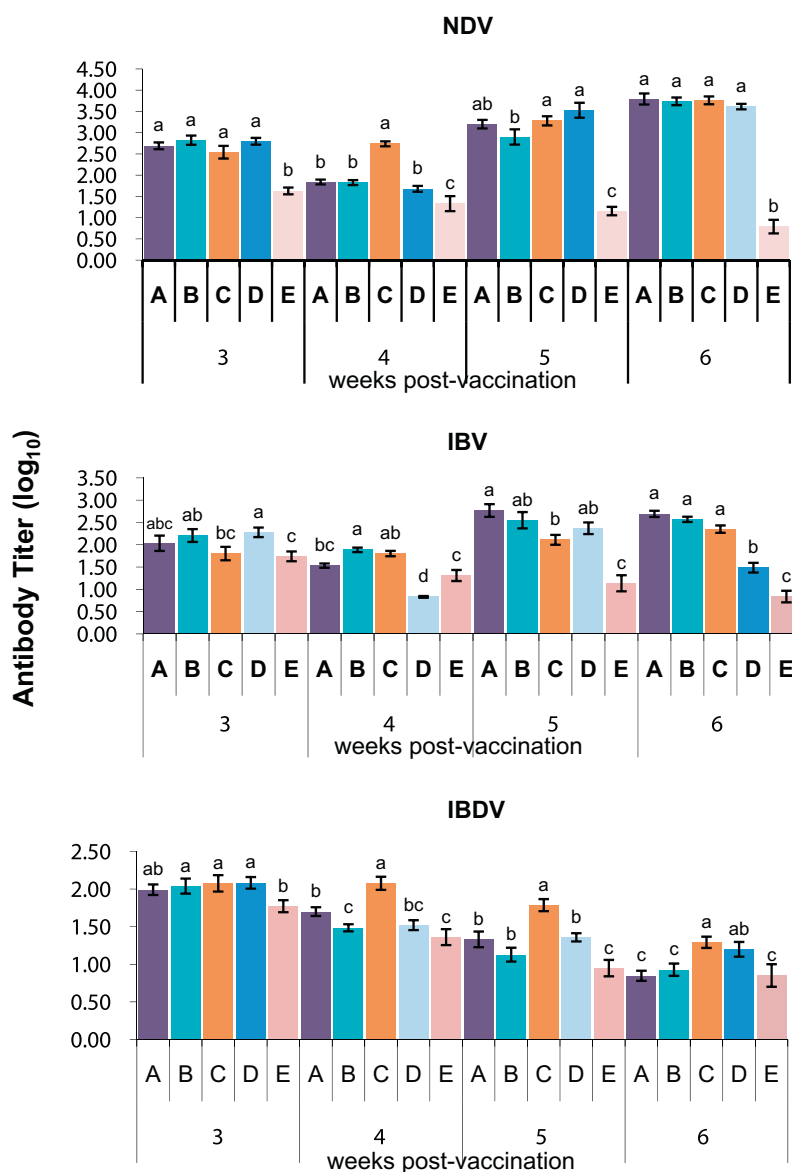


Figure 1 Newcastle disease virus, infectious bronchitis virus and infectious bursal disease, respectively virus-specific antibody titers in chickens ($n = 12$) immunized with 0.1 mL of virus activated vaccine. Blood samples were collected on 0, 7, 14, 21, 28, 35 and 42 days post-immunization for ELISA assay. Bars with different letters at the same time point are significantly different ($P < 0.05$).

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