

Effect of a *Bacillus* (3 strains) spore-based probiotic in improving production performance in broilers under necrotic enteritis challenge

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Necrotic enteritis is a major cause of economic loss in the poultry industry. Although necrotic enteritis can be effectively prevented by antibiotics, the industry is moving towards an antibiotic free program. This results in the need for effective antibiotic alternatives against necrotic enteritis. The main objective of the present study was to evaluate the effect of a *Bacillus* (3 strains) spore-based probiotic in improving performance in broiler birds under necrotic enteritis challenge. The study included a control or no additive group, probiotic (SPORULIN®@250g/MT of feed), and BMD50 (Bacitracin Methylene Disalicylate @ 500g/MT of feed). All birds were raised on battery cages (8 replicates/treatment; 8 birds/replicate) and challenged with *Eimeria maxima* (~5,000 oocysts) at 14d followed by *Clostridium perfringens* (~10⁸ cfu/ml) at 19, 20, and 21d of age. Body weight gain, mortality, and feed intake were measured during 14-21d and 14-28d, while necrotic enteritis lesions were recorded at 21d. Data were analyzed using ANOVA and means were separated with Fisher's protected LSD test. There was no difference ($P>0.05$) in body weight gain and cumulative feed intake among the treatment groups at different time points. However, BMD50 showed improvement ($P<0.05$) in cumulative feed conversion ratio (cFCR) during both 14-21d and 14-28d, while the probiotic group showed improvement ($P<0.05$) in cFCR only during 14-28d which was not different ($P>0.05$) from BMD50. Furthermore, both the probiotic and BMD50 showed similar ($P>0.05$) mean lesion scores and reduced ($P<0.05$) severity of NE lesion scores compared to control. Probiotic reduced mortality ($P<0.05$) when compared to control, and BMD50 reduced mortality ($P<0.05$) compared to both control and probiotic groups. At the end of the trial, the cumulative performance index of probiotic group was higher ($P<0.05$) than control and lower ($P<0.05$) than BMD60. In conclusion, results from the study suggest that the *Bacillus* (3 strain) spore-based probiotic could be effective in reducing the severity of necrotic enteritis as well as improving performance in broiler birds and can be used as alternative to antibiotics.

Keywords: *Eimeria maxima*, *Clostridium perfringens*, probiotics, antibiotics, BMD60