

Evaluation of Eimeria-dietary challenge model to test the benefits of alternatives for antibiotic growth promoters in broiler birds.

Vivek Kuttappan^{*1}, Juxing Chen¹, Fenglan Yan¹, Mercedes Vazquez-Anon¹, ¹*Novus International Inc, St. Charles, MO.*

Eimeria infection is a major reason for economic loss to the modern poultry industry due to its direct impact on performance, and being a major predisposing factor for dysbacteriosis leading to necrotic enteritis. The main objective of present study was to develop an Eimeria-dietary challenge model to test the efficiency of various alternatives for antibiotic growth promoters (AGP). In experiment 1, doses of 0, 20, 50, and 100× of a commercial coccidiosis vaccine containing 3 different species of Eimeria were tested in birds fed with either corn-soy (DIET-1) or corn-soy with DDGS/animal protein (DIET-2) diets (8 replicates/treatment; 8 birds/replicate) throughout the trial. Birds were challenged with Eimeria on 14d of age, and performance as well as serum color were measured on 23d of age. In experiment 2, the treatment groups (10 replicates/treatment; 10 birds/replicate) included no challenge control (NC), challenged/positive control (PC; challenged with 20× commercial vaccine on 14d), PC + Probiotic (spore based probiotic), PC + Essential oil (NEXT ENHANCE 150; NE150), and PC + bacitracin methylene disalicylate (BMD). All the birds were fed with DIET-2 throughout the trial. On 23d performance as well as serum parameters were measured. Data were analyzed using ANOVA and means were separated with Fisher's protected LSD test at $P < 0.05$. Results from experiment 1 showed that as the dose of Eimeria challenge increased there was a reduction ($P < 0.05$) in body weight, cumulative feed conversion (cFCR), cumulative performance index (cPI), and serum color (an indicator of nutrient absorption). Furthermore, birds fed with DIET-2 had lower ($P < 0.05$) cFCR and cPI than DIET-1. In Experiment 2, PC showed reduction ($P < 0.05$) in body weight, cFCR, cPI, and serum color compared with NC. In addition, Eimeria challenge also resulted in increased ($P < 0.05$) level of serum IL-10, an anti-inflammatory cytokine, in PC compared with NC. Interestingly, probiotic, NE150, and BMD showed improvement ($P < 0.05$) in cFCR and reduction in serum IL-10 levels when compared with PC birds. Therefore, BMD and AGP alternatives such as probiotics and essential oils can improve performance in broiler birds under Eimeria challenge, plausibly by reducing tissue damage associated with the infection. In conclusion, Eimeria challenge along with corn-soy DDGS/animal protein diet could be an effective challenge model to test alternatives for AGPs such as BMD.

Key Words: Eimeria challenge, dietary challenge, probiotics, essential oil, antibiotic growth promoter