

Preventive Effects of OxC-beta on a Necrotic Enteritis Challenge Model of Broiler Chickens

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Introduction: Beta-carotene is one of the most abundant carotenoid compounds and may contain beta-carotene derived oxygen copolymers (OxC-beta). *In vivo* assays indicate OxC-beta treatment enhances the phagocytic activity of monocytes and increases intestinal immune function. Necrotic enteritis (NE) has been widely found in the commercial broiler chickens since the ban of antimicrobial growth promoters. This study evaluated the preventive effect of OxC-beta ('OxC-beta™ Livestock' product from Avivagen Inc., Canada) in a subclinical necrotic enteritis broiler chicken model based on various measurements, including survival (mortality) rate, clinical signs, body weight, weight gain, intestinal lesion severity, and bacterial enumeration compared to the non-medicated bird group.

Materials and methods: Animals used were vaccinated (Newcastle disease virus) Ross broiler chicks obtained at 1 day old from a commercial hatchery. The evaluation items for all birds were carried-out in the chicken isolator during the whole experimental period. Non-antibiotic and non- anticoccidial broiler feed was supplied to the bird groups. For the subclinical necrotic enteritis chicken model, *C. perfringens* (CP-13) isolated from broiler chickens with necrotic enteritis was challenged orally two times a day with approximately 1×10^8 CFU/ml during the 14-to-16 day periods.

Results: Since the *Clostridium perfringens* challenge, mean body weight of the OxC-beta treatment groups was significantly ($P < 0.05$) increased relative to the non-medicated bird group. The body weight of the 2 parts-per-million (ppm) OxC-beta treatment group steadily increased for the 1-to-28 day period. The average weight gain of OxC-beta treatment groups for the whole trial period was restored to the weight achieved by the non-challenged bird group. The intestinal lesion scores due to NE infection were significantly ($P < 0.05$) alleviated by OxC-beta treatment groups compared to the non-medicated bird group. Among them, the lesions of the 2 ppm OxC-beta treatment group was more improved than the remaining treatment groups. The number of Clostridial bacteria in feces was reduced by OxC-beta with a dose-dependent pattern.

Conclusion: Low ppm levels of OxC-beta in feed can contribute to the prevention and improvement of NE in commercial broiler chicken farming and is expected to have a positive effect in improving productivity for the feeding period. This research was supported by Avivagen (Avivagen Inc., Ottawa, Canada), Project title: "Preventive effect of OxC-beta on Necrotic Enteritis Model with Broiler Chicken". This research was supported by Animal Disease Management Technology Development (Project No. : 311007-5), Ministry of Agriculture, Food and Rural Affairs.

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