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PhD Dissertation Defense

Entitled

CHEMICAL CHARACTERIZATION OF TRICHODERMA REESEI DEGRADED DATE PITS AND ITS EFFECT ON GROWTH PERFORMANCE AND INTESTINAL BACTERIAL POPULATION AND ANTIOXIDANT STATUS - A COMPARATIVE STUDY WITH MANNANOSE AND MANNANOLIGOSACCHARIDE ON BROILERS

By

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Date & Venue

11:00 AM

Thursday, 13 June 2019

Room 132, Building F3

Abstract

With the increasing apprehension over food safety nowadays, there have been relentless efforts aiming for substitute antibiotic growth promoters (AGPs) in poultry feeds. Thus, this research study aims at investigating the potential effects of natural alternatives on antibiotics in poultry feeding. An experiment was conducted to examine the effect of commercial antimicrobials and the individual use of degraded date pits (DDP), mannan oligosaccharide (MOS) and mannose on growth performance, microbial growth, antioxidant and biochemical effects, intestine development and antibacterial gene expression in broiler chickens. Date pits (DP) were degraded with the fungus *Trichoderma reesei* using solid-state degradation (SSD). Results showed that biological degradation with *T. reesei* significantly improved the nutritional effect of DP by increasing the proximate content, monosaccharide composition, mineral content and *in vitro* antioxidant activities. Also, it has increased the beneficial intestinal bacteria and suppressed the harmful one. In order to examine the role of different dietary treatments in broilers, one-day-old Brazilian broiler chicks "Cobb 500" were randomly divided into six treatments with six replicates, which consisted of a typical corn diet containing corn-soy, corn diet containing corn-soy + Oxytetracycline 50g/100Kg, diet containing 10% DDP, diets containing 0.2% MOS and 2 diets containing 0.1% and 0.2% mannose respectively. In the first phase, we studied the effect of different diets on the growth performance and intestinal resident bacterial population of broilers. The results generated showed that there were no significant differences in body weight, feed intake, and feed conversion ratio (FCR) among the different dietary treatments. Total bacterial count, *E. coli*, *Enterobacteriaceae*, *Shigella* and *salmonella* count, were significantly decreased in 10% DDP diet fed broilers, 0.2% MOS and antibiotic diet fed broilers. In the second phase, we studied the antioxidant and biochemical effects of different dietary treatments on broilers, and the results showed that the activity of antioxidant enzymes in serum, liver and intestine of broilers fed diets with 10% DDP and 0.2% MOS were increased significantly. The Malondialdehyde (MDA) content was significantly decreased in 10% DDP, and 0.2% MOS diet fed broilers. Among the different dietary treatments, 10% DDP and 0.2% MOS diet helped the gut development as evidenced by enhanced levels of digestive enzymes, histomorphology of intestine, and weight and length of intestinal segments as duodenum, jejunum, and ileum. Results of carcass weights showed the beneficial effect of DDP on intestine development. Immunoglobulin levels in serum and intestinal contents, the expression pattern of *muclin-2*, *cathelicidins*, *beta-defensins* and LEAP-2 in jejunum were up-regulated in 10% DDP, and 0.2% MOS diet fed broilers. From the generated findings, it could be concluded that all experimental diets have similar effects on growth performance, which suggests DDP can be used as a growth promoter, an energy source for replacing part of the corn. Prebiotics such as MOS is a preferred alternative to AGPs, but it is not abundantly produced chiefly in the Arabian Peninsula, whereas the DDP is produced abundantly to use as a broiler feed additive.

Keywords: Boilers; Degraded date pits; Microbial population; Growth promoter, Antibiotics; Oxytetracycline; Growth performance; Intestinal development.