RESEARCH ABSTRACT

PORK SAFETY

Title: Conjugated Linoleic Acid: A Dietary Immune Modulator that Decreases Intestinal Inflammation (NPB # 01134).

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Abstract

Pig dietary formulations have been supplemented with antibiotics at sub-therapeutic concentrations to enhance growth performance. The observation that the intestinal wall of pigs fed antibiotic-supplemented diets was thinner than that of pigs fed antibiotic-free diets lead to the speculation that antibiotics enhance feed utilization by suppressing inflammation of the intestinal mucosa. More specifically, antibiotics inhibit inflammatory responses of the host by directly targeting the intestinal bacteria. This anti-microbial activity sometimes results in the induction of antibiotic-resistant bacterial pathogens. To avoid the potential development of anti-microbial resistances, the present project aimed at developing a nutritional technology that targets the inflammatory responses of the host rather than the growth of the bacterial populations. Conjugated linoleic acid (CLA) prevents diseases of inflammatory origin. However, no studies were available on the roles of CLA on intestinal inflammation. We hypothesized that colonic inflammation and bacterial-induced growth suppression can be ameliorated by dietary CLA supplementation. To test this hypothesis, inflammation of the colonic mucosa was triggered by challenging pigs fed either soybean oil or CLA-supplemented diets with an enteric bacterial pathogen (i.e., *Brachyspira hyodysenteriae*). A factorial (2×3) arrangement within a split-plot design, with three littermate pigs as the experimental unit for the infectious status (i.e., infected or non-infected), and pig within litter as the experimental unit for immunomodulatory treatment (i.e., control diet, CLA-supplemented diet, or vaccine) were used in data analysis. Inflammatory markers were assayed in colonic lymph nodes, colon, hypothalamus, and skeletal muscle of pigs. Colonic mucosal lesions and lymphocyte subset distribution were evaluated by histology and immunohistochemistry. Supplementation of CLA in the diet prior to the induction of colitis decreased mucosal damage, maintained cytokine profiles (i.e., interferon-□ and interleukin-10) and lymphocyte subset distributions (i.e., $CD4^+$ and $CD8^+$) resembling those of non-infected pigs, and attenuated growth suppression. The suppressed susceptibility to inflammation and maintained growth performance following infection in CLA-fed pigs results in a positive economic value for health.