ORAL ADMINISTRATION OF LACTOBACILLUS CONFERS BENEFICIAL EFFECTS AGAINST SALMONELLA INFECTION IN CHICKENS

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Introduction:
Poultry and eggs are the biggest sources of S. enteritidis infection in the human population. Although S. enteritidis infection rarely causes symptoms in chickens, the infection leads to the colonization of S. enteritidis in the lower gastrointestinal tract followed by periodical shedding, which causes widespread S. enteritidis infection in the entire flock and represents a significant threat to public health. Moreover, a previous study identified mice found on chicken farms as the most important amplifier of the S. enteritidis bioconcentration in the chicken industry. In this study, the efficacy of a Lactobacillus strain on the inhibition of S. enteritidis was evaluated using chicken infection models.

Methods:
L. paraplantarum 6-5, a strain from Korean pickled peppers, was isolated and identified at the species level. L. paraplantarum was cultured for 24 h at 37°C in De Man, Rogosa and Sharpe (MRS) broth (Difco, USA).

One-day-old chicks were divided into four groups (30 chickens/group), and groups 1 and 3 were orally challenged with 1 mL 5 x 10^7 CFU/mL S. enteritidis. To form contact-exposure groups, groups 2 and 4 were cohoused with groups 1 and 3, respectively, immediately following the challenge. To evaluate the efficacy of L. paraplantarum in the inhibition of S. enteritidis using a chicken model, L. paraplantarum was administered in feed-additive form. The chicks in groups 1 and 2 were fed L. paraplantarum-supplemented feed, and the chicks in groups 3 and 4 were fed nonsupplemented feed.

Results:
At 7, 14, and 21 dpc, S. enteritidis growth in the small intestine was measured, and S. enteritidis environmental detection was performed. Oral administration of L. paraplantarum reduced S. enteritidis growth in the cecum, except at 7 dpc in contact-exposed chicks. Although there was no statistical significant between the Lactobacillus-treated and control groups, decreased S. enteritidis shedding was found. Similar to the S. enteritidis growth measurement results, there was no significant difference in the rate of S. enteritidis environmental detection between groups, although the rate was lower in the Lactobacillus-treated group.

Discussion:
Although the results of the chicken experiment were not statistically significant, growth of S. enteritidis in the intestine of L. paraplantarum-treated chickens was moderately inhibited. Therefore, increasing the number of animals in each group and modifying the L. paraplantarum administration method used, as discussed above, would likely confer more promising results regarding the efficacy of L. paraplantarum administration in animals. As a probiotic, L. paraplantarum has potential as a control measure against S. enteritidis infection in both mice and chickens. Our results indicate that utilization of L. paraplantarum as a probiotic might be an effective control measure for S. enteritidis-related food poisoning by reducing both S. enteritidis contamination in poultry products and S. enteritidis-related clinical symptoms in humans.

Keywords: Salmonella, Chicken, Feed-additive, Lactobacillus, Korean pickled pepper, Probiotics

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