

THE EFFECT OF PREBIOTIC ON GUT MORPHOLOGY OF BROILERS UNDER *SALMONELLA ENTERITIDIS* CHALLENGE

Ali Maddahian¹, Hamid Mostafavi²

1. Department of Agriculture, Payam-e-Noor University

2. Kerman Jihad Agriculture Educational Center

maddahian@pnu.ac.ir

INTRODUCTION

Pathogens are one of the most effective factors in the changes of intestine morphology and nutrient absorption. These changes are more obvious in the upper parts of the intestine. Pathogen bacteria cause damage in mucosal layer of broilers' intestine. One of the most important species of these pathogens is *Salmonella enteritidis* which changes the dimensions of intestine villi. It also can cause infection in humans. prebiotic is an indigestible feed ingredient which is selectively used by useful gut bacteria. One group of prebiotics is mannanoligosaccharides that prevent pathogens from attaching to intestinal wall by being adsorbed to them. This experiment was conducted to study the effect of prebiotic on gut morphology of broilers under *Salmonella enteritidis* challenge.

MATERIALS AND METHODS

240 one-day-old broiler chickens (Ross 308) were divided into 4 treatment groups with 6 replicates in randomized complete block design. Treatments included 1) negative control, 2) positive control (*Salmonella* challenge), 3) negative control plus prebiotic, 4) positive control plus prebiotic. At day 10, chickens in the challenged groups received 1.5×10^5 cfu/chick of *Salmonella enteritidis* through oral gavage. At days 21 and 42, one chick was slaughtered per each replicate. In these birds, small sections (2.5 cm) were taken from the middle of duodenum, jejunum and ileum. These samples were fixed in 10% formalin. Afterward, they were dehydrated in a graded series of ethanol, diaphanized in xylene and paraffin embedded. Cross sections of the intestine were made at 5 μ m and they were stained with hematoxylin and eosin. Ten readings per sample for villi perimeter and height, and crypt depth were done. Statistical analyses were conducted with the general linear model procedure of SAS for Windows version 9.1.

RESULTS AND DISCUSSION

At days 21 and 42 the difference of duodenum villi dimensions was not significant among treatments ($p > 0.05$). The length of jejunum villi in prebiotic groups was significantly more than that of negative control group at day 21 ($p < 0.05$), but other dimensions of jejunum villi did not have any significant differences at days 21 and 42 ($p > 0.05$). At both days, the length of ileum villi in negative control plus prebiotic group was significantly more other groups ($p < 0.05$), but the difference of other dimensions of ileum villi were not significant among treatment groups at days 21 and 42 ($p > 0.05$). In this experiment, using prebiotic increased the length of intestinal villi relatively. The morphological changes of intestine due to prebiotic supplementation are probably because of the interaction between intestine micro-flora and enterocytes. Increase in the length of intestine villi is caused by increase in the size or number of epithelial cells.

Our findings are in agreement with Baurhoo *et al.* (2009) that reported mannanoligosaccharides raise the length of intestinal villi. Awad *et al.* (2009) and Brummer *et al.* (2010) also reported similar results. In conclusion, increase in number and/or size of villi leads to better nutrient digestion and absorption and consequently better performance of broilers.

Keywords: prebiotic, *Salmonella enteritidis*, intestine, morphology

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