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## **Morphological and immunological evaluations performed in chickens subjected to “in ovo” microbiota enrichment; a preliminary study**

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In the post-antibiotic era, poultry industry has focused on the use of probiotics, live bacteria capable of beneficial effects to the health of the host [1], and on their administration techniques [2, 5]. The aim of this study is to evaluate the effects of the *in ovo* administration, into the amnion, [4] of the probiotic mixture Slab51<sup>®</sup> (comprised of the following strains: *Streptococcus thermophilus* DSM 32245, *Bifidobacterium lactis* DSM 32246, *Bifidobacterium lactis* DSM 32247, *Lactobacillus acidophilus* DSM 32241, *Lactobacillus helveticus* DSM 32242, *Lactobacillus paracasei* DSM 32243, *Lactobacillus plantarum* DSM 32244, and *Lactobacillus brevis* DSM 27961), considering the hatchability of eggs, growth performances, intestinal morphology and development of main organs of the immune system. At 18 days of incubation, 135 Ross-308 eggs were divided into three groups. The eggs of groups P1 and P2 were inoculated with  $1 \times 10^6$  and  $1 \times 10^5$  CFU of probiotic bacteria, diluted in 0.5 ml of saline sterile solution respectively. Control group eggs (C) were inoculated with 0.5 ml of saline sterile solution. The hatchability is reduced in P1 due to the greater probiotic concentration. The weight of the chicks, evaluated weekly, was significantly higher in P1 and P2 than in C, throughout the duration of the experiment. The birds were conventionally slaughtered at 28 days of age for human consumption. Samples from duodenum, ileum and caecum were processed for the evaluation of the intestinal morphology. When compared to group C the parameters of villus height and crypt depth are both increased in duodenum and ileum of treated groups, indicators of an increased absorbent surface, while villus width is only increased in ileum of P2 group. In treated groups is also observed a constant functional increase of the lymphopoietic system, element resulting from the evaluation of thickness of the lamina propria, area of the splenic, bursal and intestinal lymphoid tissue, all parameters related to a greater cellular mitotic index. Preliminary results demonstrate the benefits of the treatment in all observed parameters, confirming the safety of the technique [5], and its enormous potential in preventing perinatal and early rearing period bacterial and parasitic infections, also in association with standard protocols of anti-viral vaccination [3] which are carried out in the poultry industry.

(1) Awad, W. A., Ghareeb, K., Abdel-Raheem, S., & Böhm, J. (2009). Effects of dietary inclusion of probiotic and synbiotic on growth performance, organ weights, and intestinal histomorphology of broiler chickens. *Poultry science*, 88(1), 49-56.

(2) Bai, S. P., Wu, A. M., Ding, X. M., Lei, Y., Bai, J., Zhang, K. Y., & Chio, J. S. (2013). Effects of probiotic-supplemented diets on growth performance and intestinal immune characteristics of broiler chickens. *Poultry science*, 92(3), 663-670.

(3) Bar-Shira, E., Sklan, D., & Friedman, A. (2003). Establishment of immune competence in the avian GALT during the immediate post-hatch period. *Developmental & Comparative Immunology*, 27(2), 147-157.

(4) Cheled-Shoval, S. L., Amit-Romach, E., Barbakov, M., & Uni, Z. (2011). The effect of *in ovo* administration of mannan oligosaccharide on small intestine development during the pre-and posthatch periods in chickens. *Poultry Science*, 90(10), 2301-2310.

(5) Cox, C. M., & Dalloul, R. A. (2015). Immunomodulatory role of probiotics in poultry and potential *in ovo* application. *Beneficial microbes*, 6(1), 45-52.