Evaluation of the anti-Campylobacter activity of Lactobacillus salivarius SMXD51, a bacteriocin-producing lactic bacteria, in broiler chickens

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Campylobacteriosis is the most frequently reported zoonotic disease in humans in the European Union with 214,779 cases in 2013. Poultry is the main reservoir of Campylobacter and poultry meat the main source of human infection. Reducing Campylobacter colonization in broilers from livestock will therefore have a major health impact on consumers. Several intervention strategies are being developed in the primary production, including the use of probiotics. Lactobacillus salivarius SMXD51, a strain isolated from chicken ceca, has shown in vitro anti-Campylobacter activity by its ability to produce a bacteriocin [1, 2]. The aim of the current study was to evaluate the effect of Lb. salivarius SMXD51 on cecal colonization of Campylobacter of artificially inoculated broiler chickens.

For this purpose, 2 groups of 30 day-of-hatch Ross PM3 chickens were used. Every 2-3 days, chickens were individually treated orally with 100 µL of MRS broth for the first group (control group) and with 100 µL of a Lb. salivarius suspension grown in MRS broth (3.7±1.7 x 10⁸ CFU/mL) for the second group (treated group). At day 11, chickens from the 2 groups were individually inoculated orally with 100 µL of a culture of C. jejuni C97Anses640 strain at 5.5±0.9 x 10⁵ CFU/mL. At days 14 and 35, 15 birds per group were euthanized. Campylobacter and Lb. salivarius loads were assessed in cecal contents following the decimal dilution method and by quantitative real-time PCR respectively.

Ceca of the control group harbor 7.1±0.5 and 8.3±0.4 log₁₀ CFU/g of Campylobacter at days 14 and 35, respectively. At day 14, the comparison between the control and treated groups showed a non-significant reduction of 0.82 log. After 35 days, a significant reduction of 2.81 log was observed (P value<0.001) and 73% of chickens treated with Lb. salivarius exhibited Campylobacter loads less than 7 log₁₀ CFU/g. Lb. salivarius was not detected in the control group while 7.8±0.3 log₁₀ CFU/g were enumerated in the cecal content of chickens from the treated group.

In conclusion, Lb. salivarius SMXD51 presents an in vivo anti-Campylobacter effect, leading to a 100-fold decrease in the cecal loads of Campylobacter in broilers. In addition, this potential probiotic seems to be able to persist in the digestive tract of broiler chickens. For a future industrial application, an in vivo assay to test this strain as a food additive will be challenged.

Keywords: probiotics; lactic bacteria; anti-Campylobacter activity; broiler chickens

References