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DEVELOPMENT OF A PHAGE SPRAY PROTOTYPE WITH ANTI-SALMONELLA ACTION FOR FISH CONSERVATION

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RESUMO

The search for innovative solutions for food preservation has been a constant priority, especially when it comes to ensuring food safety related to contamination by *Salmonella* spp., which can lead to severe food infections and even death. Therefore, this study aimed to develop a prototype of a spray based on bacteriophages (phages) with anti-*Salmonella* action that could mitigate the contamination of this pathogen in fish. Lytic phages (viruses that lyse bacteria) were prospected from several samples of soil, sewage water and fish from the Amazon region. The strain of *Salmonella typhimurium* NEWP 0028, 0.45 µm filters and the double-layer agar method were used for the isolation, purification and titration of phages. Two sprays were prepared: one based on phages and sterile distilled water [1.5 x 10^{11} CFU/mL] and another spray containing *S. typhimurium* and sterile 0.85% NaCl solution [1.5 x 10^{6} CFU/mL]. Five fresh specimens of hake (*Plagioscion squamosissimus*) were used. A total of 50g was removed from each fish, of which a 25g portion was used for the initial quantification of *Salmonella* spp. In the other 25g, 1mL of the spray containing *S. typhimurium* was sprayed. These 25g were divided into two equal parts of 12.5g to carry out two treatments, T1 and T2. T1 (control) corresponds to the sample with only the pathogen spray; T2 contains the pathogen and the spray of 1mL phage spray. After 5 hours, *S. typhimurium* was quantified using the spread method in Salmonella-Shigella medium, identification/confirmation using the Berguey key and the CFU/g was calculated. The experimental design was designed in Randomized Blocks (DBC). Each fish was considered a block (local control). A generalized linear model with Poisson distribution (count per area) was assumed to compare means between treatments and fish. Statistical analysis was performed using R software (open source). After the analyses, a statistical difference was detected (at a significance level of 5%, p-value = $2x10^{-16}$) between T1 (mean/standard deviation, $2184.67x10^{-4}$/$1162.2x10^{-4}$, CFU/g) and T2 ($2.8x10^{-4}$/$1.9x10^{-4}$, CFU/g). Surprisingly, these preliminary data showed a 771-fold decrease in the *S. typhimurium* population in the sample, highlighting the potential of the spray for fish conservation and public health. Our results point to the pioneering development of a new Amazonian phage spray effective against *S. typhimurium*, which could improve food safety and maintain the excellent quality of fish and other foods. Funding source: FAPESPA/ CNPQ 2022/14379272 and PA04 AmazonBiotec | Inova Amazônia – Tração.

PALAVRAS-CHAVE: Phage, Salmonella, spray, food safety

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