

TITLE: ANTIMICROBIAL ACTIVITY OF FREE AND LIPOSOME-ENCAPSULATED THYMOL AND CARVACROL AGAINST *SALMONELLA* ADHERED TO STAINLESS STEEL

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ABSTRACT:

Antimicrobial activity of thymol, carvacrol and thymol/carvacrol liposomes (TCL) was evaluated against two monospecies bacterial pools, each one consisting of four strains of *Salmonella enterica*. TCL were prepared through thin-film hydration, showing 270.2 nm average diameter (polydispersity index of 0.33) and zeta potential of +39.99 mV. Minimal inhibitory concentration (MIC) for *Salmonella* spp. pool was 0.331 mg/ml of thymol and carvacrol, whereas MIC for TCL was 0.662 mg/ml. Bacterial pools (8 log CFU/ml), allowed in contact on stainless steel AISI 304 coupons in UHT skim milk for 15 min, resulted in adhered populations of 5.6-6.1 log CFU/cm². A 10-min contact with free (MIC and 2.0 MIC) and encapsulated (MIC) antimicrobials eliminated attached *Salmonella* spp.; however, at 1-min contact time, even 2.0 MIC of thymol and carvacrol were ineffective to inactivate adhered *Salmonella* spp. For TCL (at MIC), *Salmonella* spp. were eradicated following a 10-min contact; after 1-min contact, adhered *Salmonella* spp. populations were decreased by 2.01 log CFU/cm². Considering antimicrobial concentrations and contact times, thymol, carvacrol, and TCL could be employed in food-contact surfaces to prevent biofilm formation at early stages (bacterial attachment). Further investigations should be performed regarding the long-term antibacterial effects of TCL.

Keywords: thymol; carvacrol; liposomes; *Salmonella* spp.

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