

Bactericidal Efficacy of Carvacrol Nanocapsules in Chia Mucilage for the Reduction of *Salmonella* in Spaghetti alla Carbonara

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INTRODUCTION & AIM

The Hazard Analysis and Critical Control Point (HACCP) system for preparations containing raw eggs indicates the need for thermal processing to eliminate the risk of *Salmonella*.

Several culinary preparations, such as Spaghetti *alla Carbonara*, are added with raw eggs after heat treatment, making them hazardous because the temperature and contact time (with the bacterial agent) may not be sufficient to eliminate the biological hazard.

For hazard control, studies have shown that some plant essential oils have antimicrobial properties and could replace the use of synthetic preservatives.

However, as their application is limited by the lower stability and higher volatility characteristic of this type of compound, their application can be enhanced using nanotechnology.

This study aimed to evaluate the bactericidal effect of carvacrol nanocapsules in chia mucilage on the identified hazard when used in the preparation of Spaghetti *alla Carbonara*.

METHOD

Thirty samples of *Spaghetti alla Carbonara* were prepared and tested at five temperatures: 50, 55, 60, 65 and 70 °C.

Six samples were used per temperature, including one control.

After reaching the target temperature at the thermal center, eggs inoculated with *Salmonella* and nanocapsules were added.

Microbiological analyses were performed to quantify *Salmonella*.

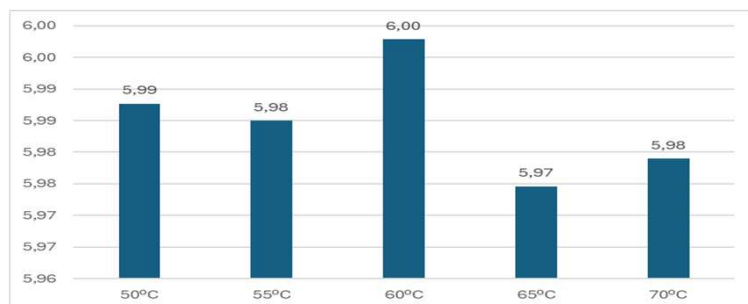
Preliminary tests had isolated the thermal effect, allowing evaluation of the nanocapsules' impact.

RESULTS & DISCUSSION

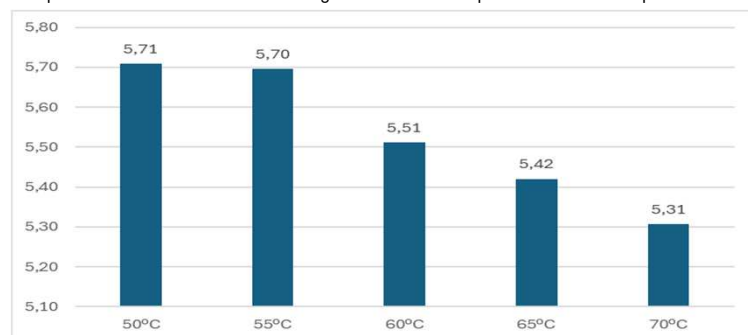
The nanocapsules were more effective at 50 °C (5.7 log) than at 70 °C (5.3 log).

This can be explained by the increasing bactericidal effect of temperature, which reduces the relative contribution of the nanocapsules.

At lower temperatures, where thermal inactivation is less pronounced, the nanocapsules' antimicrobial action becomes more evident, enhancing overall bacterial reduction.



Graph 1 - Reduction of inoculum through the action of temperature and nanocapsules.



Graph 2 - Reduction of inoculum through the action of nanocapsules.

CONCLUSION

Food safety has direct and indirect effects on both economic operators and consumers, and it is becoming increasingly urgent to develop and implement methodologies that reconcile food safety with the interest and gastronomic value of food.

FUTURE WORK / REFERENCES

Cacciatore, F. A., Maders, C., Alexandre, B., Barreto Pinilla, C. M., Brandelli, A., & da Silva Malheiros, P. (2022). Carvacrol encapsulation into nanoparticles produced from chia and flaxseed mucilage: Characterization, stability and antimicrobial activity against *Salmonella* and *Listeria monocytogenes*. *Food Microbiology*, 108. <https://doi.org/10.1016/j.fm.2022.104116>

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