Stability of EPA and DHA in turkey sausage enriched with algae oil: effect of microencapsulation and storage

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Introduction

The lipid profile of meat products is frequently criticised due to their elevated saturated fatty acid content. The enrichment of these products with omega-3 (ω-3) polyunsaturated fatty acids, especially eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), is a promising strategy to improve their nutritional quality [1]. Algae oil is a sustainable source of ω-3, although its addition to long-life meat products is limited by its high susceptibility to oxidation and potential losses during storage. The microencapsulation by spray-drying is a technique that traps the algae oil within a wall, thereby facilitating its retention in the product and protecting it against external pro-oxidant factors [2].

Objective

The present study evaluates the EPA and DHA retention and the oxidative stability during refrigerated storage in turkey sausages enriched with algae oil, either as bulk oil or by microencapsulation using different wall materials.

Methods

Three batches of turkey sausages were produced enriched with omega-3-rich algae oil, either as bulk (OB) or by microencapsulation using chitosan-maltodextrin (CM) or pea protein (PP) as wall materials.

The sausages were vacuum-packed and stored for a period of 15 days under refrigeration.

The samples were analysed before and after storage in order to determine their EPA and DHA content using gas chromatography, and their oxidation levels using the thiobarbituric acid reactive substances (TBARS) assay.

Results

Results showed a significant loss of EPA and DHA in BO samples, with DHA decreasing by more than 50% during storage (Figure 1). Conversely, microencapsulation significantly improved the stabilisation of ω-3 fatty acids. CM microcapsules exhibited minimal losses over time, while PP microcapsules were also found to provide retention, though to a lesser extent. Regarding oxidation, a significant increase was evident in BO, while CM exhibited the lowest levels (Figure 2).

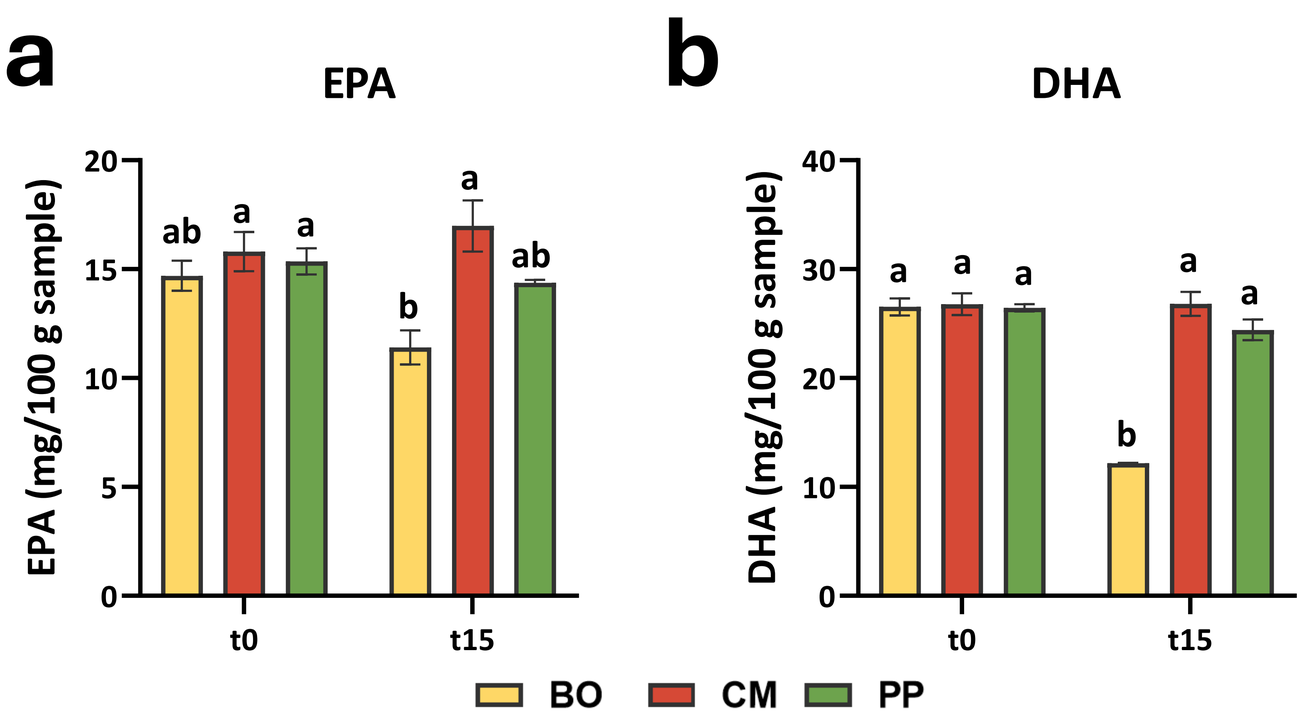

Figure 1. EPA (a) and DHA (b) in turkey sausages enriched with algae oil as bulk (BO) or microencapsulated with chitosan maltodextrin (CM) or pea protein (PP) as wall materials. Significant differences are indicated by different letters (a, b).

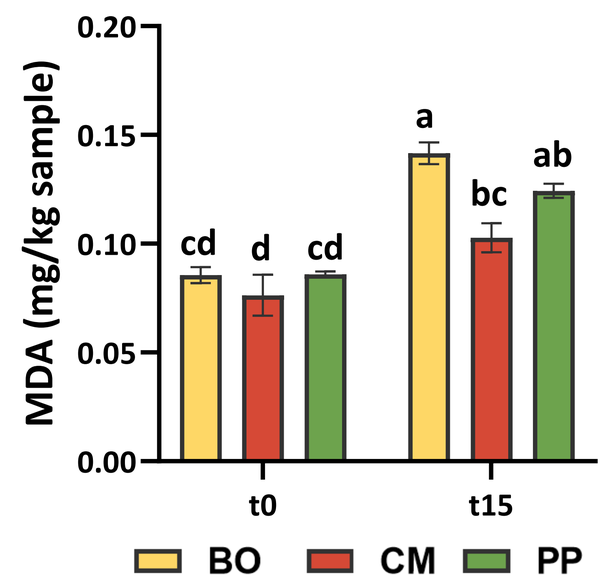

Figure 2. TBARS values in turkey sausages enriched with algae oil as bulk (BO) or microencapsulated with chitosan maltodextrin (CM) or pea protein (PP) as wall materials. Significant differences are indicated by different letters (a, b).

Conclusion

Microencapsulation, particularly with chitosan-maltodextrin, proves to be an effective strategy to preserve omega-3 fatty acids and mitigate oxidative degradation in functional meat products during refrigerated storage.

Bibliography

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