



FUNCTIONAL RICOTTA CHEESE WITH *DUNALIELLA SALINA* ALGAE EMULSION

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ABSTRACT

Microalgae are a remarkable source of essential biomolecules with several uses that may be exploited for commercial applications. The objective of the present work was to prepare a novel Ricotta cheese supplemented with *Dunaliella salina* algae emulsion formula containing mint essential oil (mint EO) as a functional food ingredient. Total phenolic compounds (TP), total flavonoids (TF), DPPH antioxidant capacity, and identification of phenolic and flavonoids compounds of algae were determined. Moreover, the chemical, physical, rheological, microbiological, organoleptic characteristics, and chemical score of the resulted Ricotta cheese were investigated. The results showed that TP, and TF contents in *D. salina* algae crude extract are 8.48 (mg GAE/g DW), and 5.93 (mg QE/g DW), respectively. Also, *D. salina* has high levels of phenolic acids (e.g., gallic acid, chlorogenic acid, caffeic acid, and rosmarinic acid); as well as high flavonoid content (e.g., catechin, naringenin, quercetin, rutin, and hesperetin). The DPPH procedure showed that *D. salina* algae antioxidant activity is 42.19 ± 0.39 mg/ml as IC_{50} value, while Ricotta cheese supplemented with algae emulsion formula showed gradual adequate free radical scavenging ability with the algae level increased. The amino acids profile revealed that *D. salina* algae contains 17 amino acids with the highest value of threonine, as well as total amino acid (TAA) is 949.69, which contains 424.2 essential amino acids (EAA) with a 0.447 TAA/EAA ratio. However, *D. salina* algae/Mint EO emulsion was prepared using a non-ionic surfactant (Tween 80). The incorporation of *D. salina* algae emulsion into Ricotta cheese processing led to an increase in their protein, fat, and mineral levels compared to control cheese. Also, all color attributes were decreased for algae Ricotta cheese in comparison to the control sample. The total bacterial counts were significantly ($p \leq 0.05$) lower in the algae cheese samples than the control. The yeast and mold count in control cheese appeared after 14 days, whereas it didn't appear in II and III algae Ricotta cheese until day 21 of storage. However, the addition of an algae emulsion formula improved all sensorial attributes of Ricotta cheese during storage at 5 °C for 21 days, especially at the level of 0.5% (II), and the same level of algae emulsion led to an increase in most amino acid content, and the chemical score of amino acids (e.g., methionine + cysteine, histidine, and isoleucine) compared to control cheese.