

**COENZYME Q₁₀ CONTENT, COMPOSITION, TEXTURE AND
PHYSIOCHEMICAL CHARACTERISTICS OF PASTA FORTIFIED WITH
FREEZE-DRIED BEEF HEART**

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ABSTRACT

This study evaluated the feasibility of fortifying fresh pasta with beef heart, a beef by-product high in coenzyme Q₁₀. Incorporating freeze-dried beef heart into pasta significantly increased coenzyme Q₁₀ and protein content, which were unaltered by cooking, but also significantly changed physical attributes, including texture and color, of the fortified pasta products. Alterations in pasta matrixes, after partially replacing durum wheat flour with freeze-dried beef heart, were evaluated at the molecular level using vibrational spectroscopic methods, FT-IR and Raman spectroscopy accompanied by multivariate statistical analyses. The results were deduced that lipid-protein interactions, β -sheet arrangement, the starch network, and cysteine thiol groups might contribute to hardness and chewiness of the pasta products. The lipid fraction and β -sheet alignment were possibly involved in pasta adhesiveness. Pasta firmness might be caused by β -sheet structure and the polysaccharide network. Pasta cohesiveness might be affected by the α -helical structures and hydrogen bonds in the gluten network. It was concluded that FT-IR and Raman Spectroscopy can be applied to evaluate physiochemical changes of pasta and showed a potential use for quality assessment in pasta products because of rapidly and non-destructively determining changes related to many food components, including protein, carbohydrate, and lipid, at one time measurement.