J Food Microbiol Saf Hyg 2018, Volume 3
DOI: 10.4172/2476-2059-C2-012

Effect of freezing of poultry meat on the activity of β-hydroxyacyl-CoA-dehydrogenase

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Introduction & Aim: Chilling and freezing are widely used for poultry meat preservation. However, freezing leads to quality alterations, as crystallized water causes fiber and cell disruption. Fresh/chilled poultry, considered of higher quality, is visually indistinguishable from frozen poultry, presenting an attractive target for adulteration. To inforce regulations, a robust analytical method capable of correctly identifying thermal history is required. A technique described by Gottesmann and Hamm relies on the activity dosage of the mitochondrial enzyme β-hydroxyacyl-CoA-dehydrogenase (HADH). This study aims to optimize the procedure and determine a more sensitive cut-off limit distinguishing fresh from frozen poultry meat in the Lebanese market.

Method: In the conducted descriptive empirical study a total of 109 chicken breasts were examined. Two sets of chilled breasts were analyzed before and after freezing at ±22 °C for 5 days with or without defrosting at 4 °C for 24 hours. A third set of frozen breasts was studied before and after refreezing at ±22 °C. Released in the intracellular fluid, HADH is measured spectrophotometrically through the conversion rate of NADH to NAD+ based on the following reaction: Acetoacetyl-CoenzymeA+NADH+H+HADH β-hydroxy-CoenzymeA+NAD+.

Findings: The ratio cut off limit was decreased from 0.5 to 0.3, resulting in 100% correct identification of frozen poultry instead of 93.75%. HADH activity was significantly higher for frozen samples.

Conclusion: Greater control over incorrectly labeled poultry meat and increased consumer protection can be achieved with the use of the modified thermal identification method. The vast differences in HADH values between fresh and frozen samples suggest the possibility of correct thermal identification based on one dosage upon reception, reducing analysis cost.

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