

Accepted Manuscript

Analysis Of The Freezing Time Of Chicken Breast Finite Cylinders

Claudio Zilio , Giulia Righetti , Giovanni Pernigotto ,
Giovanni A. Longo

PII: S0140-7007(18)30309-8
DOI: <https://doi.org/10.1016/j.ijrefrig.2018.08.013>
Reference: IJIR 4080



To appear in: *International Journal of Refrigeration*

Received date: 3 April 2018
Revised date: 30 July 2018
Accepted date: 19 August 2018

Please cite this article as: Claudio Zilio , Giulia Righetti , Giovanni Pernigotto , Giovanni A. Longo , Analysis Of The Freezing Time Of Chicken Breast Finite Cylinders, *International Journal of Refrigeration* (2018), doi: <https://doi.org/10.1016/j.ijrefrig.2018.08.013>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ANALYSIS OF THE FREEZING TIME OF CHICKEN BREAST FINITE CYLINDERS**Claudio ZILIO¹, Giulia RIGHETTI¹, Giovanni PERNIGOTTO², Giovanni A. LONGO¹**¹ University of Padova, Department of Management and Engineering
Str.lla S. Nicola, 3, I-36100 Vicenza, Italy² Free University of Bozen-Bolzano, Faculty of Science and Technology
Piazza Università, 5 I-39100 Bolzano, Italy

righetti@gest.unipd.it, giovanni.pernigotto@unibz.it, claudio.zilio@unipd.it, tony@gest.unipd.it

CORRESPONDING AUTHOR:

Claudio ZILIO

University of Padova, Department of Management and Engineering
Str.lla S. Nicola, nr.3, I-36100 Vicenza, Italy
claudio.zilio@unipd.it**ABSTRACT**

Chicken meat is among the most largely consumed meat worldwide. The shelf life of chicken meat is rather short so freezing is largely used to reduce water activity and stop the microorganism proliferation. In this paper experimental data available in the literature for food freezing, including poultry products, are briefly reviewed. Then, some new experimental measurements are presented for freezing of packed cylindrical chicken breast samples in air. The experimental freezing times were compared with the estimations of several semi-empirical or approximate models in the literature. Furthermore, by means of User Defined Functions for the implementation of the temperature-dependent thermophysical properties of chicken meat, the commercial CFD software package STAR-CCM+ was used for analyzing the freezing process and estimating the freezing times of the tested specimens. For engineering purposes, it was decided to follow a simplified approach, by using an average value of the overall airside heat transfer coefficient. The numerical estimations were rather good (mean relative error -1.4 % and mean absolute error 2.4 %).

HIGHLIGHTS

- Experiments on total freezing time of poultry samples were performed
- The variability of the predictions of some semi-empirical models was tested and critically discussed.
- STAR-CCM+ CFD package was used for the implementation of a 3D finite volume numerical model of meat freezing.
- Experimental measurements, results of semi-empirical models, and outputs of the numerical tool were compared.

KEYWORDS

Chicken breast, freezing time, experimental data, semi-empirical models, CFD, STAR-CCM+.

Download English Version:

<https://daneshyari.com/en/article/11012116>

Download Persian Version:

<https://daneshyari.com/article/11012116>

[Daneshyari.com](https://daneshyari.com)