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MATHEMATICAL MODEL STUDY TO OPTIMIZE THE FREEZE DRYING PROCESS FOR PRODUCTION OF DRIED YOGURT

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ABSTRACT

The aim of this study was to build mathematical models for optimizing a technological process producing a freeze-dried yogurt product with good quality based on solving multi-objective optimization problems. The application of Utopia Point Method for the optimization process determined the optimal freeze-drying conditions including drying temperature of 36.6°C, drying pressure of 0.023 mmHg and drying time of 35.6 hours. The optimal drying process resulted in the freeze-dried yogurt product with a moisture content of 0.963%, a crispiness of 15.953 mN and 69.291% of viable beneficial microorganisms were preserved. In addition to the good quality criteria of the dried product, the drying process also consumed only 19.94 kWh of electrical energy to produce 1 kg of product, which suggests the high production applicability of the developed freeze-drying process.