

**Title:**

**Development and implementation of an innovative food freezing under microwave radiation process**

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**Abstract:** (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

The freezing process of food matrices is affected by their dominant constituent which is water. The final quality of the frozen product depends on the phase transition or the crystallization process of changing water into ice. The size of the ice crystals is critical for the final quality of the frozen food as it can cause irreversible damage to the cellular structure which in turn degrades the texture and colour of the product. For this reason, several emerging technologies have been developed in order to control the crystallization process and to improve the rate of ice crystal formation and growth. Most of these technologies take advantage from the physical properties and the characteristics of the water molecule.

In this study, a novel experimental setup was developed and an innovative process was implemented aiming at the application of microwave radiation during freezing of a food matrix. The results acquired from the present study are considered as remarkable and promising. The developed freezing process was applied on pork tenderloin samples. The application of microwaves during cooling the samples caused oscillated decrease of temperature and had a significant impact on the crystallization process as the degree of supercooling was decreased circa 92% under the tested conditions. The meat microstructure evaluation showed a 62% decrease in the average ice crystal size when samples were frozen under a microwave field as compared to the conventional freezing process. These results indicate that the application of microwave radiation during freezing may reduce the damage of the meat tissue and in turn to retain better texture in the frozen meat.