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A Critical Assessment of the Effects of Sterilisation on Processed Cheese Qualities Intended to Facilitate Nutrition during Times of Crisis and Emergency

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Description

The world has been hit hard by natural and man-made emergencies over the past few decades. These emergencies have the potential to get out of hand quickly and require sophisticated methods of crisis management to stop. Providing humanitarian and/or military missions with logistical support is an essential responsibility of organizations sending emergency teams. The right amount of preparedness for a crisis also includes having the right tools for feeding employees. Special long-shelf-life food packages known as combat rations can be used as part of the operation's logistical support during the initial days of deployment for soldiers, rescue workers, or humanitarian workers. The follow-up standard and the standardization agreement stipulate that the components in the packages must be stored for at least 24 months at 25°C.

Sterilization at temperatures around 120°C with a holding time of several dozen minutes is the preferred method due to the limitations on the ability to control temperature during transport and subsequent storage. Dairy products are a great source of essential nutrients that help the personnel maintain their physical endurance, so including them in these combat rations and national material reserves is highly desirable from a nutritional standpoint. However, only powdered dairy powders, sterilised processed cheeses, and condensed milk are among the dairy products that are stable at temperatures below 25°C [1].

One of the most common and effective methods of extending the storage life in recent decades has been to preserve food by heating it and sealing it in hermetic packaging. The heat-treated food's organoleptic, nutritional, and functional properties must also be preserved to the greatest extent possible. Heating during sterilization significantly alters the color, consistency, and flavor of thermolabile biologically active substances as well as their flavor. The last responses are mostly connected with the course of the complex of Maillard responses (CMR). Notwithstanding, CMR can likewise prompt the arrangement of cycle toxins, which stand out lately. Many of these compounds, especially heterocyclic aromatic amines like pyridoimidazoles, pyridoindoles, and tetraazafluoranthenes, have the potential to cause cancer and mutagenesis. The rate of the CMR process is influenced by a number of factors, including the heat treatment method, the temperature applied, the holding time for this temperature, the rate of the gradient of temperature increase and subsequent cooling, and the use of different raw materials for food production [2].

Displaying heat transport (inside the item) by conduction to different food varieties has been the subject of numerous distributions. However, there are very few studies on the effects of sterilisation on the properties of processed cheese with a very narrow range of DM and FDM content in dairy products. On the other hand, there are processed cheeses on the market that have a much wider range of DM and FDM. Therefore, the goal of this study was to sterilize processed cheeses (PC) in a hermetically sealed container for 40 minutes at 120°C with a DM content of 30–55 g/100 g and a FDM content of 30–50 g/100 g. To begin advanced regression analysis techniques were used to model the time course of actual temperatures in individual processed cheeses in order to describe the relationship between the product's DM and FDM content and the heat treatment process. The microbiological, chemical, textural, viscoelastic and organoleptic parameters of non-sterilised (NPC) and sterilised (SPC) processed cheese were then compared after 30 days of storage. It was also looked at how the products' DM and FDM content affected the properties of the samples, such as the CMR rate and lipid oxidation, to look for potential health risks from chemicals. In view of the outcomes acquired, the action zeroed in on upgrading the blend of DM and FDM content of SPC and evaluating its quality and wellbeing and, subsequently, its ease of use for strategic help in crisis/emergency circumstances and capacity in state material stores [3,4].

The containers made of laminated aluminium that had seal lids were filled with the hot melt. The sample in the container had a weight of approximately 95 ± 2 g, so it was separated into two groups: samples that had not been sterilized (NPC) and samples that had been sterilized in accordance with the conditions listed below (SPC). The NPC were kept at 6 ± 1°C while they cooled. On the same day that the melt was made, the samples that were supposed to be sterilized were cooled down to 25°C and sterilized. The autoclave used was a laboratory autoclave with an inner diameter of 405 mm and a height of 600 mm. A holding time of 40 minutes and a temperature of 120°C were used. Compressed air was fed into the retort to maintain the same pressure as the container during the first few minutes of the cooling period. After cooling in the autoclave to a final temperature of 50°C, the samples were cooled to 25 ± 1°C [5].

Conclusion

The inflexion point simplifies the shape of the regression function, which is well in line with the graphical waveform of the observed processes. This makes it easy to determine how the DM content and FDM values affect the current sterilisation temperature in the container as a function of sterilisation time. According to the results of an examination of the measured parameters and the estimated inflexion points, the temperature increase is influenced by the respective DM and FDM contents in each case. As a result, the results' analysis reveals that the tinf parameter is a useful characteristic for comparing the progress of these kinds of thermal processes and can be suggested for future use.

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Conflict of Interest

None.

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