



Hacettepe University

Synbiotic Ice Cream Production with Probiotic and Prebiotic

Umut KÖROĞLU, Sena SADIKOĞLU, Elif Bircan MUYANLI, Remziye YILMAZ*

Hacettepe University, Food Engineering Department, 06800, Beytepe Campus, Ankara, TR

*remziye@hacettepe.edu.tr

ABSTRACT

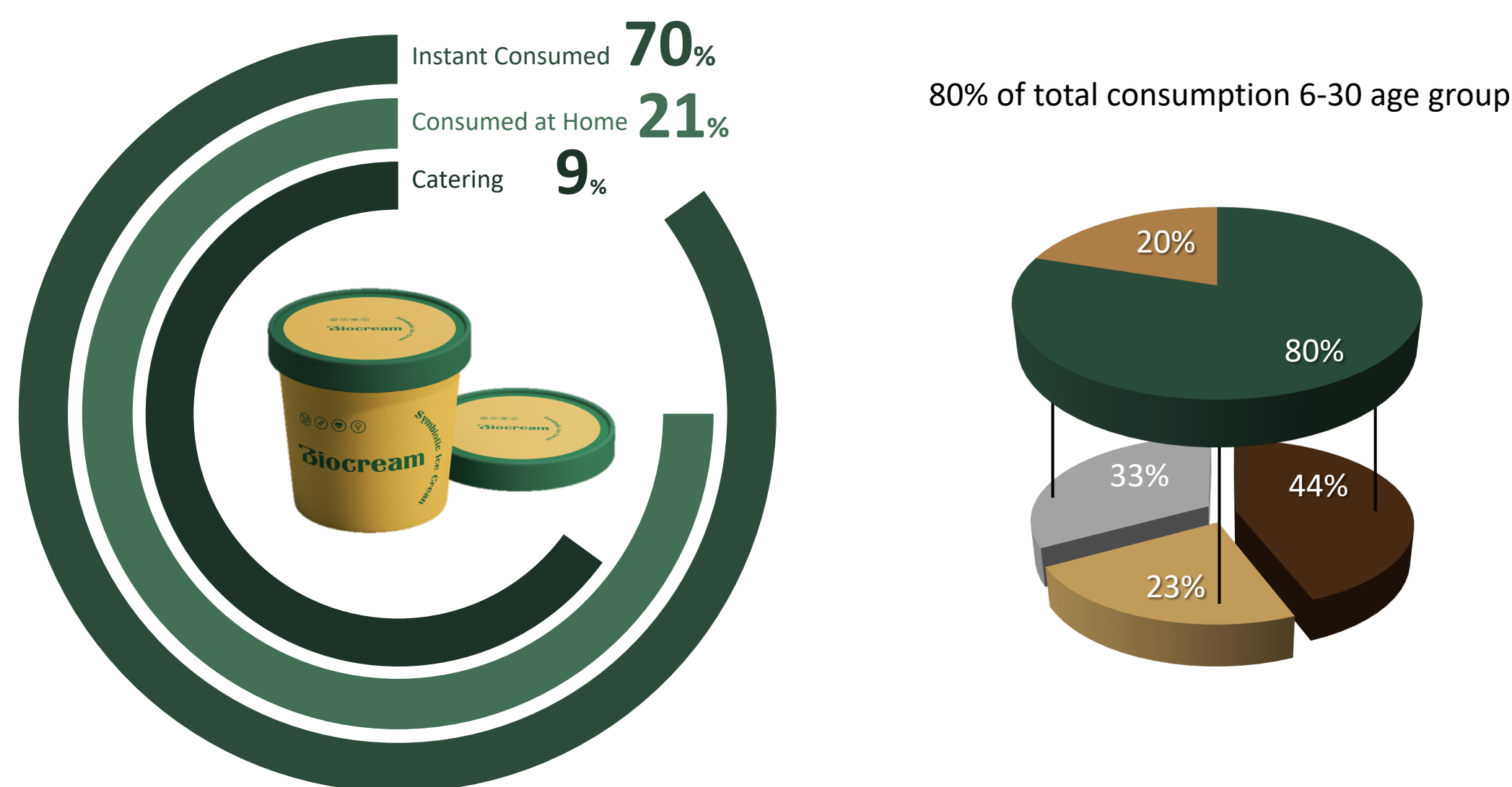
Along with the increasing pace of life, the benefits that consumers want to get from the foods they consume are also increasing. In this direction, the importance of functional foods comes to the fore day by day. This increasing need has caused the functional food deficiency on the shelves to be noticed. It is known that R&D studies have gained importance as a result of the market search for this field in the FMCG (Fast-Moving Consumer Goods) sector, which is growing rapidly throughout the world and in our country. The changes in dietary habits brought about by the Covid-19 pandemic have also contributed to the orientation towards functional foods. In this study, it was aimed to produce synbiotic ice cream with improved functional properties by adding prebiotics and probiotics. In the production of ice cream, *Lactobacillus rhamnosus* GG strain was used as a probiotic and inulin was used as a prebiotic. In the study, 3 groups of ice creams (control, containing *Lactobacillus rhamnosus* GG strain and containing both *Lactobacillus rhamnosus* GG strain and inulin) were produced and the microorganism growth, chemical properties (pH, brix, overrun) and sensory properties were analyzed. As a result of the study, it has been proven that the sensory and rheological properties of ice cream are improved with prebiotic inulin, and additionally, it supports the development of probiotic microorganisms in ice cream production. An ice cream product containing a higher number of probiotic microorganisms was obtained with the sample of ice cream containing prebiotics and probiotics together. In future studies, it was aimed to produce synbiotic ice cream by improving the physical and sensory properties of ice cream with Antifreeze proteins (AFP) and High Intensity Ultrasound Technology (HUI).

Keywords: Functional Food; Synbiotic Ice Cream; *Lactobacillus rhamnosus* GG; Probiotic; Prebiotic.



INTRODUCTION

Ice cream, which is a dairy product that everyone loves, is suitable for consumption in all seasons as well as being seasonal. Vitamins and minerals in its content increase its importance in terms of nutrition. When the functional food groups consumed are examined, milk and dairy products are at the top in this field. Because of the high nutritional value among these products and being one of the dairy products whose composition can be easily changed, ice cream is a product suitable for production with functional properties. Researches to improve the functional properties of ice cream are mostly on enrichment of ice cream with probiotics and prebiotics. When functional foods are mentioned, probiotic, prebiotic or synbiotic products that contain both come to mind. It is possible to make various improvements on ice cream by using different ingredients.



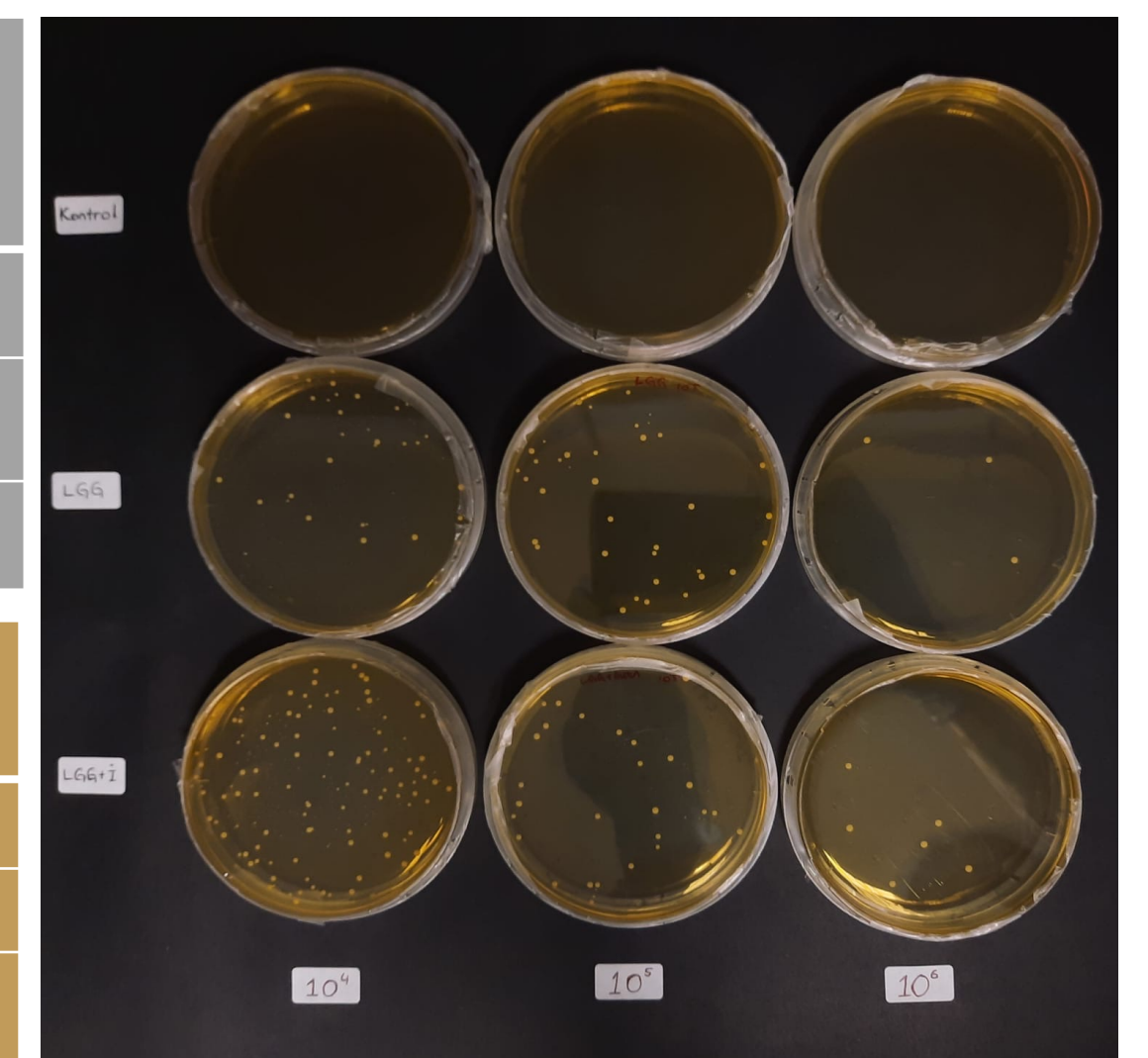
RESULTS

The average of the scores given by the participants.

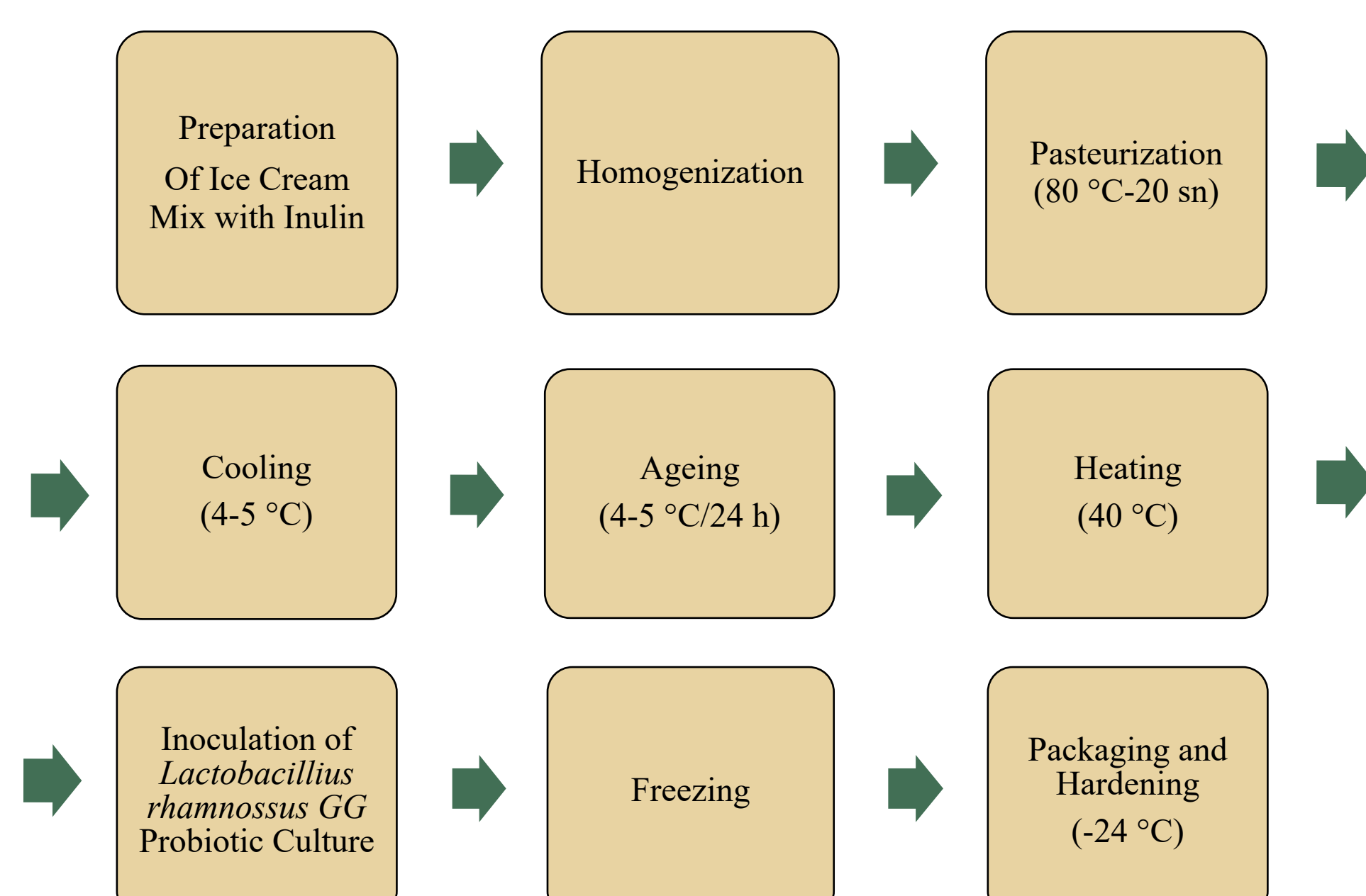
	Color and Visual (Out of 5 Points)	Structure and Consistency (Out of 5 Points)	Taste and Smell (Out of 10 Points)	Total (20 Points)
Control	4,2	1,2	4,8	10,2
LGG	4,1	1,4	6,4	11,9
LGG+Inulin	4,4	2,1	8,6	15,1

	Control (cfu/ml)	LGG (cfu/ml)	LGG+Inulin (cfu/ml)
1st Count	0	$3,7 \times 10^8$	$3,7 \times 10^8$
2nd Count	0	$2,7 \times 10^6$	$1,8 \times 10^6$
3rd Count	0	$3,9 \times 10^7$	$3,4 \times 10^7$

	LGG	LGG +Inulin	Control
pH	6,40	6,45	6,50
Brix	33 %	34 %	32 %
Overrun	7,30 %	7,30 %	7,30 %



MATERIAL & METHOD



DISCUSSION

The first of the success criteria aimed in the synbiotic ice cream, where we made preliminary prototype studies; It is the awareness of the number of live probiotic microorganisms added in cfu/ml. The second is the preservation of the viability of a certain number of probiotic microorganisms inoculated into the ice cream mixture during production. After the product is produced, the number of microorganisms contained in the process from storage to the customer should be more than 10^6 cfu/ml according to the Turkish food codex.

In the product, the unique taste and odor characteristics of the *Lactobacillus rhamnosus* GG strain did not have a negative effect on consumption, and no negative feedback was received as a result of the panels made. It is necessary to prevent taste changes that may result from pH changes and to achieve the same taste (stable pH) in every batch produced.

As a result of the analysis of the prototype that was worked on, it was confirmed that the above-mentioned success criteria ($>10^6$ cfu/ml live microorganism in the final product) were met. R&D studies on the product and the use of more advanced technologies and the development of the sensory properties of the product will be the subject of further studies. It is aimed to produce advanced synbiotic ice cream with AFP proteins and high-intensity ultrasound technology.

ACKNOWLEDGEMENT

We would like to thank Hacettepe Technology Transfer Center (HTTM) for the training they provided within the scope of TÜBİTAK 1512.

REFERENCES

- K. S. Dayisoğlu, Y. Gezginç, and A. Cingöz, Fonksiyonel Gıda Mı, Fonksiyonel Bileşen Mi? Gıdalarda Fonksiyonellik, *Gıda*, 39, 1, 57–62, **2014**.
- Tarım ve Köy İşleri Bakanlığı, Türk Gıda Kodeksi Dondurma Tebliği, *Resmî Gazete*, Ankara, **2004**.
- T. Di Criscio *et al.*, Production of functional probiotic, prebiotic, and synbiotic ice creams, *J. Dairy Sci.*, 93,10, 4555–4564, **2010**.
- A. Kazemi *et al.*, Effect of probiotic and synbiotic supplementation on inflammatory markers in health and disease status: A systematic review and meta-analysis of clinical trials, *Clin. Nutr.*, 39, 3, 789–819, **2020**.
- F. DURLU ÖZKAYA and B. ONURLAR, Moleküler Probiyotik Dondurma (Molecular Probiotic Ice Cream), *J. Tour. Gastron. Stud.*, 6, 3,154–168, **2018**.
- R. W. Hartel, S. A. Rankin, and R. L. Bradley, A 100-Year Review: Milestones in the development of frozen desserts, *J. Dairy Sci.*, 100, 12, 10014–10025, **2017**.