

OPTIMISING ACCEPTABILITY OF A NEW LEMON FLAVOURED DAIRY DESSERT



P. L. Arcia ^{1,2}, A. Tárrega ¹, E. Costell ¹



¹ Instituto de Agroquímica y Tecnología de Alimentos
P.O. Box 73, 46100, Burjassot, Spain

² Laboratorio Tecnológico del Uruguay
Av. Italia 6201, 11500, Montevideo, Uruguay

INTRODUCTION

Consumer-orientated product optimization brings the consumer into the product development at an early stage. The knowledge of how the composition and the interactions between ingredients affect sensory perception of food will provide valuable information to successfully develop a new product. A useful tool for optimising sensory quality of foods is the application of the Response Surface Methodology (RSM) to model the variation in acceptance with food composition changes¹. The main purpose of the present work was to optimize the acceptability of a lemon flavoured dairy dessert using RSM.

Samples: Lemon-flavoured dairy dessert

Composition and preparation

Modified tapioca starch (C* CreamTex 75,720, Cerestar, Spain), commercial sucrose, lemon flavour 16508* (Lucta, Spain), milk powder (Central Lechera Asturiana, Spain), mineral water (Font Vella) and colorant T-PT8-WS (CHR Hansen, Spain) were used to prepare 16 dairy desserts varying in sucrose and lemon flavour concentration according to the central composite design in Table 1. Starch (3.75%), whole milk (75%), colorant (37.5 ppm) and sucrose were weighed in a flask and mixed for 10 min. Flask was placed in a water bath at 97 ± 1 °C and stirred for 25 min. Sample was cooled in a water bath at 20°C and then the lemon flavour and the water evaporated in the process were added. Samples were transferred to a closed flask and stored under refrigeration (4 ± 1 °C, 48 h) prior sensory evaluation

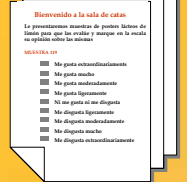


Sensory evaluation

Standardized test room



60 consumers evaluated the acceptability using a 9-point hedonic scale. Samples were served in an order following Williams design²



RSM experimental design

Table 1. Coded and uncoded levels for the two composition variables

Formulation	Coded level		Uncoded level	
	Sucrose	Lemon flavour	Sucrose %	Lemon flavour ppm
1	-1	-1	7	75
2	1	-1	13	75
3	-1	1	7	175
4	1	1	13	175
5	-2	0	4	125
6	2	0	16	125
7	0	-2	10	25
8	0	2	10	225
9-16	0	0	10	125

RSM data analysis

Second order equation (RSM):
multivariate regression analysis
(Statgraphics plus)

RESULTS

DIFFERENCES IN ACCEPTABILITY among dairy dessert with different formulation ($F = 12.23$, $p < 0.001$) can be observed in Figure 1

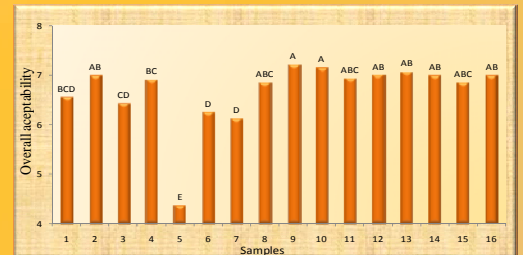


Figure 1. Mean values of the acceptability of the samples with whole milk. Samples that do not share letters are significant differences in acceptability

$$\text{Acceptability} = 0.088 + 0.015 \text{ Flavour} + 1.056 \text{ Sucrose} - 4.96 \cdot 10^{-5} \text{ Flavour}^2 - 0.046 \text{ Sucrose}^2$$

R^2 adjusted = 88.7

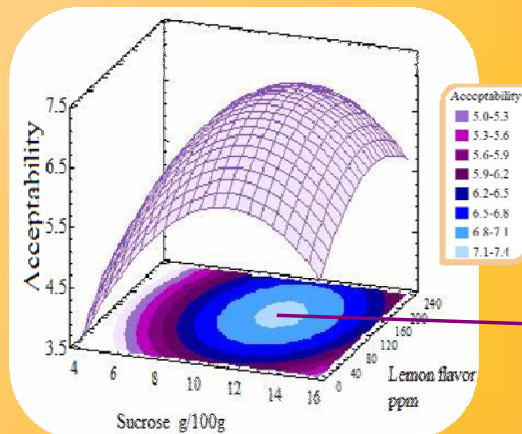


Figure 2. Response surface of overall acceptability of lemon-flavoured desserts as related to composition.

INGREDIENT LEVEL EFFECTS

Both lemon flavour concentration and sucrose concentration significantly affected the acceptability of the product, with positive coefficient for the linear term and negative coefficient for the quadratic term. As can be seen in the surface generated by the model (Figure 2), acceptability showed an inverted-U shape relationship with the concentration of both lemon flavour and sucrose

PRACTICAL APPLICATION

1. Selection of formulation with maximum acceptability:

11.5 % Sucrose
145 ppm Lemon flavour

2. Product reformulation:

Contour plot serve as a database of acceptability values corresponding to several formulation options. This information allow to propose changes in product formulation that keep a compromise between the nutritional or economic advantages and product acceptability.

REFERENCES

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