Strawberry spread - New Food New Tech

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Introduction:

This study is part of *Agrio et Emulsion* project (POCI-01-0145-FEDER-023583), new food emulsions development. Spreads are essentially water-in-oil emulsions [1]. The product innovation results from the addition of a strawberry syrup to a spreadable cream of vegetable origin, preserved at 5 ºC. The main constituent of the syrup are strawberry, sweetener, citric acid and natural thickener (pectin). Four formulations have been developed and eight syrup spreadable cream. A final prototype was selected by evaluation of a untrained panel taster. Microbiological stability was monitored and in sequence two emerging technologies, ionizing irradiation and hyperpressure were used to inactivate the microorganisms, at near room temperature to avoid the adverse effects of heat on emulsion stability [2]. Physicochemical and proximal analyzes were performed and a set of microbial populations was evaluated for microbiological stability control.

Methodology:

➢ Irradiation with ^{60}Co source, were used the following doses: 1 kGy (C2) and 1,5 kGy (C3).

➢ Hyper pressure conditions were: 400 MPa/6 min (C2), 475 MPa/6 min (C3) and 525 MPa/6 min (C4). All samples were vacuum packed.

➢ Physicochemical analysis: Titratable acidity, Total soluble solids and pH.

➢ Proximal analysis (AOAC 2000): Energy; Water contente; Crude protein; Total Fat ; Carbohydrates; Total Fiber and Total ash.

➢ Microbiological stability control: enumeration of microorganisms at 30 ºC; enumeration of lipolytic microorganisms at 30 ºC; enumeration of *Enterobacteriaceae*; enumeration of osmophilic or osmotolerant yeasts and moulds; detection of spores of sulfite-reducing Clostridia.

➢ In each technologies there were always control samples C1 (untreated).

Results:

Tabela1: Physicochemical and proximal parameters.

Parameter	Results expression	Results	Analytical method
Titratable acidity	(% w / w) oleic acid	3.675 ± 0.061	NP 1412-1977
Total soluble solids	in ºBrix	4.372±0.040	Refractometry
pH	measured in an isotonic solute of 0.1 N KCl	51.53±0.00	immersion electrode
Energy	kJ / 100 g produt	1195	Calculation
	kcal / 100 g produt	286	
Water content	g / 100 g de produto	50	Gravimetry
Crude protein	g / 100 g produt	0,2	Volumetria (Kjeldhal method)
Total Fat	g / 100 g produt	19.1	Gravimetry (Soxhlet method)
Carbohydrates	g / 100 g produt	28.3	Calculation
Total Fiber	g / 100 g produt	2.2	Gravimetry
Total ash	g / 100 g produt	0.25	Gravimetry

Tabela 2: Microbiological parameters irradiated samples.

Samples		Enumeration of microorganisms at 30 ºC (u.f.c./g)	Enumeration of lipolytic microorganism s at 30ºC (u.f.c./g)	Enumeration of Enterobacteriaceae (u.f.c./g)	Enumeration of osmophilic or osmotolerant yeasts and moulds (u.f.c./g)	Detection of spores of sulfite-reducing Clostridia in 1 g	Guidelines of INSA
15 days after irradiation	C1	6x10	< 1	< 1	< 1	Negative	Satisfatory
	C2	3x10	< 1	< 1	< 1	Negative	Satisfatory
	C3	1x10	< 1	< 1	< 1	Negative	Satisfatory

Tabela 3: Microbiological parameters hyperpressurized samples.

Samples		Enumeration of microorganisms at 30 ºC (u.f.c./g)	Enumeration of lipolytic microorganisms at 30 ºC (u.f.c./g)	Enumeration of Enterobacteriaceae (u.f.c./g)	Enumeration of osmophilic or osmotolerant yeasts and moulds (u.f.c./g)	Detection of spores of sulfite-reducing Clostridia in 1 g	Guidelines of INSA
1 day after HPP	C1	2,0x10	< 1	< 1	1,3x10^{2}	Negative	Satisfactory
	C2	6,0x10	3,0x10^{2}	< 1	< 1	Negative	Satisfactory
	C3	3,0x10	3,0x10^{2}	< 1	< 1	Negative	Satisfactory
	C4	1,3x10^{3}	3,0x10^{2}	< 1	< 1	Negative	Admissible
15 days after HPP	C1	8,0x10	3,0x10^{2}	< 1	< 1	Negative	Satisfactory
	C2	2,0x10	2,0x10^{2}	< 1	7,0x10	Negative	Satisfactory
	C3	5,0x10	2,0x10^{2}	< 1	1,0x10	Negative	Satisfactory
	C4	7,0x10	5,0x10^{2}	< 1	< 1	Negative	Satisfactory
36 days after HPP	C1	< 1	< 1	< 1	1,8x10^{2}	Negative	Satisfactory
	C2	1,4x10^{3}	4,0x10^{2}	< 1	1,0x10	Negative	Satisfactory
	C3	8,0x10	< 1	< 1	< 1	Negative	Satisfactory
	C4	3,0x10	< 1	< 1	< 1	Negative	Satisfactory
Without treatment after 33 days		< 1	< 1	< 1	< 1	Negative	Satisfactory

Conclusões:

The results for treated and untreated products showed no significant differences. The untreated samples remained stable and showed satisfactory microbiological characteristics under refrigeration at 5 °C after 3 months. Following these results, we conclude that product stability can be ensured by good manufacturing practices.
This prototype is already in the food pairing & food design phase by our project partner Escola Superior de Hotelaria e Turismo do Estoril.

References:

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[2] Pinto P., Cabo Verde S., Trigo M. J., Santana A., Botelho M. L. (2006) Food irradiation: microbiological, nutritional and functional assessment. In: Poschl, M. and Nollet, L. (Ed.), Radionuclide Concentrations in Food and the Environment, CRC Press Taylor & Francis Group, Boca Raton, Florida, Chap. 13, pp. 411-438.