YIELD AND TEXTURE OF "QUESO FRESCO" MADE FROM MILK PROCESSED BY HIGH PRESSURE HOMOGENIZATION

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INTRODUCTION

Queso Fresco is fresh, soft, white, high moisture, slightly salty cheese characterized by its crumbly texture (Van Hekken and Farkye, 2003), developed in Mexico, Latin America and the Caribbean. This Hispanic-style cheese with widespread acceptance among US consumers it is traditional manufactured using whole raw milk. However, food safety concerns and current US regulations prohibit the commercialization of Queso Fresco manufactured with raw milk.

Nonthermal processing technologies able to inactivate potential pathogens in milk but keeping proteins and other constituents in their native state (Hayes et al., 2005; Pereda et al., 2007; Taylor et al., 2007), are of interest for the processing of dairy products traditionally made from raw ingredients, such as Queso Fresco.

OBJECTIVE

The objective of this work was to determine yield and textural properties of Queso Fresco made from raw and pasteurized milks processed by high pressure homogenization (HPH). And compare the texture properties by sensory analysis and instrumental method.

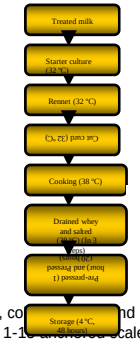
MATERIALS and METHODS

Milk processing

Raw and pasteurized (65oC; 30 min) whole milks were subjected to 0, 100, 200, and 300 MPa HPH.

Cheese manufacture

Method develop by Clark et al. 2001



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Yield = 100 * g cheese /g initial milk.

Sensory evaluation - Crumbliness, springiness, stickiness, co nd oiliness attributes were evaluated by a trained panel in a 1-1 anchored scale (Sandra et al. 2004).

Uni-axial compression test – Texture analyzer (TA-XT plus, Texture Techonoly Corp, Stable Microsystems). Cubes = 12 mm 3. Compressed = 80%. cylindrical probe= 3.5 cm. Displament speed = 0.4 mm/s.

RESULTS

Moisture and Yield

		0 MPa	100 MPa	200 MPa	300 MPa
MOISTURE (%)	RM	45.1 a*	45.8 b	48.4 c	45.9 d
	PM	46.3 d	47.9 c	49.0 b	52.3 a
YIELD (%)	RM	10.5 f	11.5 d	13.6 b	11.9 e
	PM	11.3 e	12.8 c	12.5 b	14.2 a

Table 1. Moisture and yield of cheeses made from raw and pasteurized milk subjected to different HPH treatments.
*Note: Means with the same letter are not significantly different (P < 0.05).

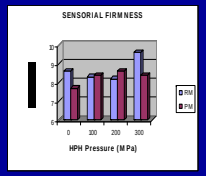

Fig 1. Firmness by sensorial analysis. Cheese made from raw and pasteurized milk subject to different different HPH treatments.

Sensorial Analysis and uni-axial compression

		0 MPa	100 MPa	200 MPa	300 MPa
FIRMNESS	RM	8.0 b	9.3 a	8.3 b	9.6 a
	PM	7.7 c	8.4 b	8.6 b	8.4 b
SPRINGINESS	RM	9.5 d	9.0 b	9.5 b c d	10.7 a
	PM	8.1 a	9.0 b	9.7 c d	9.3 b
CRUMBLINESS	RM	11.5 a	13.1 b	12.8 c	13.2 c
	PM	12.8 c	13.1 c	14.0 d	14.2 d
STIKINESS	RM	7.5 a	7.9 b	7.5 a	7.9 b
	PM	8.3 b	9.0 c	9.5 d	9.4 d
COHESIVENESS	RM	2.7 d	2.6 c d	2.2 c	1.8 b
	PM	2.8 b c	1.8 b	1.0 a	1.0 a
GREASE RESIDUAL	RM	9.6 c	7.6 b	8.6 a	7.3 a
	PM	9.2 c	8.8 b	9.1 c	8.8 c

Table 2. Texture descriptive sensory analysis of Queso Fresco cheeses made from raw and pasteurized milk subject to different HPH treatments.
*Note: Means with the same letter are not significantly different (P < 0.05).

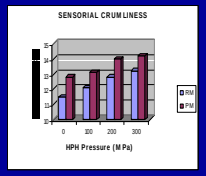

Fig 2. Crumbliness by sensorial analysis. Cheese made from raw and pasteurized milk subject to different HPH treatments.

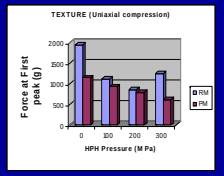

Fig 3. Force at first peak by uni-axial compression. Cheese from raw and pasteurized milk subject to different HPH treatments.

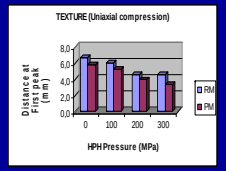

Fig 4. Distance at first peak by uni-axial compression. Cheese from raw and pasteurized milk subject to different HPH treatments.

Sensory property	Compression results	Pre-Treatment	Correlation coefficient, r
Crumbliness	Distance at First Peak	RM	-0,979 *
		PM	-0,992 **
Firmness	Force at First Peak	RM	0,202
		PM	-0,784

Table 4. Pearson correlation coefficient of crumbliness and firmness (sensory perceptions) with the distance and force at the first peak (instrumental method) in both treatment, with pasteurized milk subjected to HPH (PM) and raw milk subjected to HPH (RM).
* Probability values less than 0.05 showing significant correlation. ** Probability values less than 0.001 showing significant correlation.
Φ Uni-instrumental method.

DISCUSSION

- The moisture and yield increase with the increasing pressure homogenization until 200 MPa in raw milk and 300 MPa in pasteurized-HPH milk. In all cases, the combined treatment (pasteurization and HPH) results in higher moisture content cheeses than the raw milk subjected to HPH ones.
- The key crumbliness attribute increases with the increasing pressure homogeinización. (from 11.5 to 13.2 in cheeses from raw milk processed with 0 to 300 MPa HPH and from 12.8 to 14.2 in cheese from pasteurized and then homogenized milks). At all pressures tested HPH pretreatment pasteurization of milk gave the highest values of cheeses crumbliness.
- The pasteurization of milk without HPH treatment induce a decrease in the attribute of firmness of cheeses ranging from 8.6 (RM) to 7.7 (PM). The application of 300 MPa HPH produced an increase in firmness from 8.6 to 9.6 in raw milk and from 7.7 to 8.4 in pasteurized milk.
- An inverse relationship was observed for the attribute cohesiveness as it decreases with increasing pressure homogenization and the pre-treatment pasteurization HPH.
- Cheeses made from pasteurized-HPH milk showed increased stickiness values (~9.2) when compared to those made from raw-HPH milks (~7.5).
- The HPH treatment in raw milk produced less values in Oiliness than the rest of the cheeses studied.
- The sensory perceptions of crumbliness, correlated well with the distance at first peak by the uni-axial compression instrumental method.

CONCLUSIONS

High pressure homogenization technology has a strong potential for the manufacture of queso fresco with excellent yield and textural properties.

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