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Obtaining Cheese with Milk Mixture and Inca Peanut (Plukenetia Volubilis)

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Abstract: The Inca peanut, a plant native to the Peruvian Amazon, has an important nutritional contribution to 53% oil and 33% protein [1, 2], high content of Omega 3 and 6, Vitamin E. Recent research suggests the nutritional and therapeutic significance of consumption for the control of free radicals [3], being an alternative food to reduce nutritional deficiencies of macro and micronutrients in the diet. The results show that the cheese made from a mixture of milk and Inca peanut (70:20 *v/v*) 0.15 M of Ca sulphate is of firm consistency, with a clotting time of 9 min and yields 14.56% at 80 ℃, is similar to fresh milk cheese sensory characteristics determined by the test of acceptability. Respect to nutrition cheeses present values of protein and fat (16.3% and, 25.05%, respectively). Sensory evaluation process cheese 70:30 *v/v* showed an acceptance of 67% relative to a commercial cheese. The texture profile of the finished product, applying a deformation of 30%, have hardness values for 1.88 N, elasticity 0.08, cohesiveness 0.86, adhesiveness 0.36, gumminess 1.62 and chewiness 0.13.

Key words: Inca peanut, Inca peanut milk, Inca peanut cheese, milk mixture.

1. Introduction

The Plukenetia, is a tropical plant Euphorbiaceae family, comprising 19 species, of which 12 are in south America and 7 in Europe [4]. To Worldwide distribution of P. volubilis extending from the Lesser Antilles, Surinam and the northeast sector of the Amazon basin in Venezuela and Colombia to Ecuador, Peru and Brazil [5]. In Bolivia it was ocidentales in India reported [6] according to Webster, G. L., and Burch, D. [7] grows in the south of Panama; according to Dodson, C. and Gentry, A. [8] is also distributed in Mexico. It is one of the more plant sources large omega 3 (48%), omega 6 (36%), omega 9 (9%) and antioxidants (50%). His consumption gives energy to the brain, clean bloodstream, and it carries nutrients to the cells. The aim of the present research was to make cheese using a mixture of milk and suspension Inca peanut (Plukenetia volubilis L).

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2. Materials and Methods

The collected seeds of District Lamas, San Martin, were selected and groomed for Sacha inchi (Inca peanut) milk [1, 9]. In cheese making Sacha inchi (Fig. 1), in mixtures of 60:40, 70:30 and 80:20 *v/v* (milk and suspension of Inca peanut), coagulated with calcium sulfate (0.1 M, 0.15 M and 0.2 M) and citric acid 50% *w/v* 80 ℃, were determined time coagulation, curd performance and sensory evaluation (smell, taste and texture) to choose the best technological alternative. Proximate analysis as AOAC [10], analysis microbiological [11] and texture profile test (Andilog Textor II 100 N) characterizing the cheese.

3. Results and Discussions

3.1 Characterization Feedstock

The composition of the milk is in the range required by the NTP and Inca peanut milk containing 5.5% fat (Table 1).

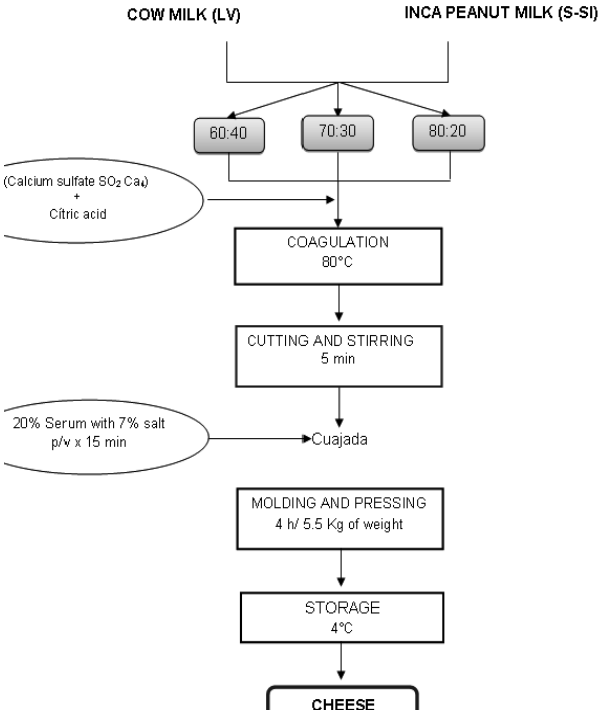


Fig. 1 Experimental flow for obtaining cheese with milk mixture and Inca peanut milk.

Table 1 Physico-chemical composition of milk and Inca peanut milk.

Components	Milk	Inca peanut milk
Soluble solids	12.10	11.40
Acidity (g/100g)	0.16*	0.07**
Density (g/ml)	1.034	1.095
pH	6.50	6.70
Humidity (%)	87.90	88.60
Protein (%)	3.30	3.00
Fats (%)	3.40	5.50
Carbohydrates (%)	4.70 (Lactose)	2.40
Ash (%)	0.70	0.50

(*) lactic acid; (**) sulfuric acid.

3.2 Clotting and Cheese Yield

Analysis of variance shows that the mixing ratio and the concentration of coagulant are statistically independent (95% probability), the clotting time mixtures of 70:30 and 80:20 are similar (Table 2); no synergy combined effect of these two variables during coagulation (Fig. 2).

3.3 Cheese Yield

The cheese yield (Table 2), vary 13.40% to 17.53%; where the mixtures with 60% and 40% of milk and milk Inca peanut to 0.1 M coagulant (calcium sulfate), it shows poor cohesion to desuerar curd solids lost in the serum and lower yields compared to mixtures (70:30 and 80:20) with 0.15 M and 0.2 M calcium sulfate, which demonstrates increased calcium in the mixture and better cohesion of the curd. Mixture 70:30 coagulated with 0.15 M calcium sulfate, it is firm, similiar behavior with 80:20 mixture *v/v* 0.2 M ca sulfate, and cheese type "Cotija" based on a mixture of milk and chickpea (80:20) [12].

3.4 Sensory Evaluation and Texture Profile of Cheeses

Sensory evaluation (color, flavor, texture and stickiness) of cheese in the 80:20 and 70:30 are statistically equal to 0.15 M, the results of response surface (Fig. 3) explain the proportion of differentiated inteaccion mixture and the concentration of cogunlant. The adhesiveness is variavilidad factor of major significance.

The comparative profile curve texture (Fig. 4) shows similarity, but in respect of rheological properties (hardness, elasticity, cohesiveness, adhesiveness, and chewiness gomosidd) are different at a 30% deformation; used for this analysis deformation [13-15] comprised between 50% and 60%.

Table 2 Clotting time of the mixture of milk and Inca peanut milk and cheese yield.

Coagulant (calcium sulfate)	0.1 M			0.15 M			0.2 M		
Mix (milk and Inca peanut)	60:40	70:30	80:20	60:40	70:30	80:20	60:40	70:30	80:20
Clotting time (min)	11.50 a	10.00 abc	8.50 cd	11.00 abc	9.00 bc	6.50 de	10.50 abc	8.50 cd	6.00 e
Cheese yield (%)	13.40 c	14.23 bc	14.98 bc	13.50 c	14.56 bc	15.65 ab	13.94 bc	14.99 bc	17.53 a

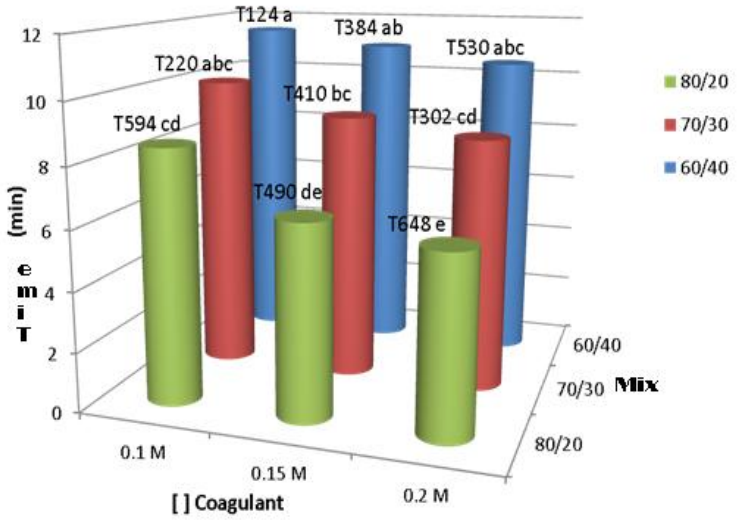


Fig. 2 Coagulation time depending on concentration and coagulant mix ratio.

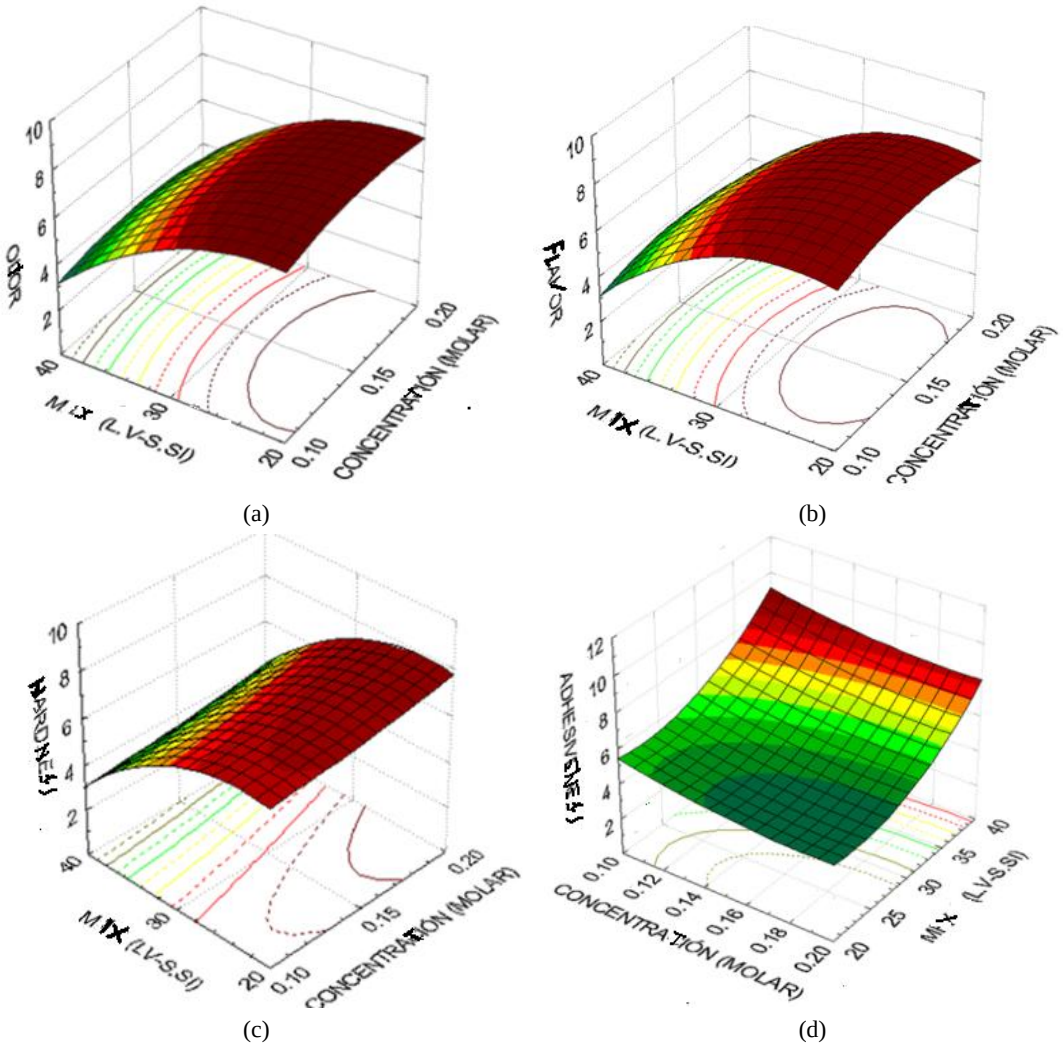
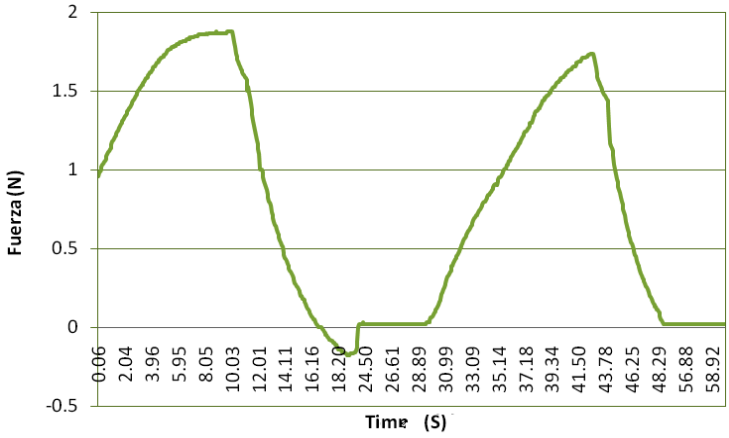
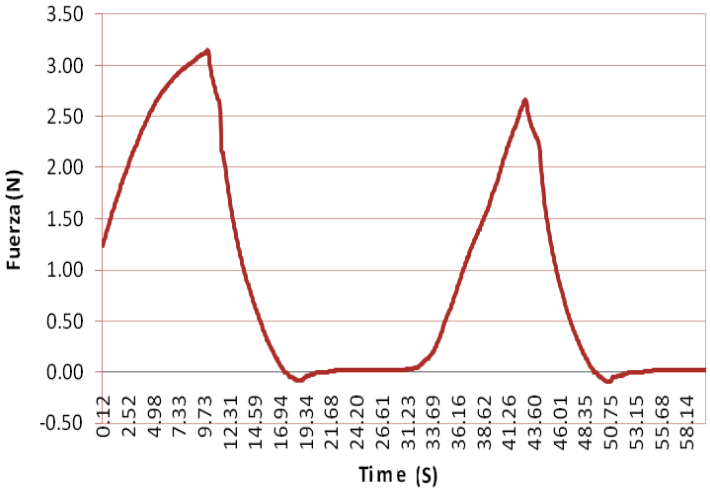


Fig. 3 Influence of the concentration of the coagulant and % of Inca peanut in the mixture (LV-S.SI) odor (a) flavor; (b) hardness; (c) adhesiveness; (d) fresh cheese.



(a)



(b)

Fig. 4 Profile curve texture fresh cheese (a) mixture of cow's milk and Inca peanut suspension; (b) cow's milk.

4. Conclusions

- The yield of cheese, is 13.40% to 17.53%, and the coagulation time at 80 ℃ for 6 and 11.5 mins;
- The best technology option for a fresh cheese was the ratio 70:30 *v*/*v* (cow's milk and sacha inchi suspension) at 0.15 M calcium sulphate and citric acid 50% *w*/*v*;
- The nutritional value of cheese (30% suspension mixture of sacha inchi) is 50.98% moisture, 16.30% protein, 25.05% fat, carbohydrates 3.31%, 3.97% ash and sensory acceptance of 67% qualifies flavored inchi sacha firm texture soft;
- The texture profile that characterizes the cheese mix (70:30) is: 1.88 N hardness, elasticity 0.08 mm, cohesiveness 0.86, adhesiveness 0.36, 1.62 gumminess and chewiness 0.13.

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