Consumer study with low sodium Brazilian Cheese (Minas fresh cheese)

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Introduction

✓The reduction of salt content is a major focus of attention of food industry, particularly in the dairy, meat and bakery sectors, which are pressured into reformulating their cheeses due to public health agencies, health warnings published in the media and by consumers looking for a healthy lifestyle (Dewitt, 2008).

✓This research aimed to evaluate the sensory acceptance of low sodium Brazilian cheese (*Minas Frescal cheese*), produced with partial replacement of sodium chloride (NaCl) by potassium chloride (KCl).

Material and Methods

Manufacture of Low sodium Minas cheese

✓Raw com milk, pasteurized at 65ºC for 30 minutes

✓cooled at 36ºC

✓Addition of Calcium chloride (Doce Aroma, São Paulo, Brazil), 0.2g/5 L milk, lactic culture (Choozit™ MA 19LYO 50DCU, Danisco Brasil) 1% p/v and the powder rennet (Clerici Power Rennet, Caglificio Clerici, São Paulo, Brazil) according to the manufacturer's recommendation;

✓**Dry salting the mass (0.8% p/p of the final product): performed a partial replacement of NaCl by potassium chloride (KCl, Sigma, São Paulo, Brazil) according to the following treatments (T1-100/0, T2-75/25, and T3-50/50 and T4-25/75 % w/w NaCl/KCl, respectively), keeping, however, the final concentration of 0.8% p/p of the total mass in relation to the final product;**

✓Packaging in plastic forms of 250 g, vacuum packed in polyethylene plastic bags and stored at

Consumer Test

✓100 consumers , degree of liking of appearance, aroma, flavor, texture and overall impression using a 9-point hybrid hedonic scale (1 = disliked immensely, 9 = liked immensely) (Villanueva & Da Silva, 2009). In addition, product acceptance and purchase intent were evaluated using a binomial scale (yes/no). Between tasting each sample, the participants were requested to eat a cream cracker biscuit and drink some water. The first order and carry over effects were balanced using a specific design (Mac Fie,Greenhoff, & Valis, 1989).

Statistical Analysis

✓A two-way ANOVA (consumers x samples) was carried out to determine the overall significance for the main effects and interactions between yogurt samples and panelists followed by Tukey's HSD test to highlight statistical contrasts among assays; The binomial scale of acceptance and purchase intent was evaluated by logistic regression.

Results and Discussion

✓T1 obtained the highest scores, regardless of the sensory attribute evaluated, while T2, (25% KCl) had scores similar to the control sample, differing only in the attribute aroma ($p<0.05$).; Indeed, for these treatments, all scores were located among 6 (like it slightly) and 7 (like it moderately) on 9-point hedonic scale.

✓T2, T3 and T4, a positive acceptance varied between 61.8% and 36.3%, whereas the purchase intent ranged between 58.1 and 30.9%.

✓Identical logit models were generated for both variables, suggesting an agreement on the part of consumers regarding their opinion; taste was the most critical attribute that most influenced the overall acceptance and purchase intent of cheeses' consumers. With odds-ratio was 0.402 for both variables, indicating that the likelihood of product being accepted is 0.402 higher for and increase of one unit of acceptability on a 9-point hedonic scale.

Table 1 - Consumer Test of Brazilian Low sodium Cheese

Aceptance	Treatments			
	T1	T2	T3	T4
Apperance	7.49[a]	7.53[a]	7.00[a]	7.10[a]
Aroma	7.02[b]	6.40[a]	6.25[a]	6.15[c]
Taste	6.92[a]	6.31[a]	5.53[c]	5.15[dc]
Texture	6.89[a]	6.91[a]	5.91[c]	5.83[d]
Overall Liking	7.10[a]	6.74[ab]	6.10[cb]	6.02[cb]

Table 2 - Parameter estimates, probability, and odds ratio estimates for predicting overall acceptance and purchase intent of low sodium cheeses

	Global Acceptance			Purchase Intent		
	Parâmeter	$Pr>X^2$	Odds Ratio	Parameter	$Pr>X^2$	Odds Ratio
Constant	10.462	0.0008		10.462	0.0008	
Appearance	-0.358	0.373	0.698	-0.358	0.373	0.698
Aroma	-0.246	0.377	0.781	-0.246	0.377	0.781
Taste	**-0.910**	**0.0139**	**0.402**	**-0.910**	**0.0139**	**0.402**
Texture	-0.204	0.398	0.815	-0.204	0.398	0.815
Overall liking	0.0667	0.828	1.608	0.0667	0.828	1.608

Conclusion

✓It is possible the development of cheese with reduced-sodium, containing 25% of potassium chloride in the salting solution.

✓The results from the logistic regression indicate that the taste was the attribute that most influenced the acceptance and purchase intent of consumers.

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