TRADITIONAL PORTUGUESE PASTRY CAKES ENRICHED WITH CHESTNUT FLOUR: EFFECTS ON NUTRITIONAL AND PHYSICAL PROFILES

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INTRODUCTION

Económicos + Chestnut flour = Strengthened product

- Nutritional and gluten free
- Maintenance of sensory properties

OBJETIVES

Analyze the **nutritional and texture** profile of *Económicos* incorporated with **chestnut flour**, as **dietary strengthening** agent, over 32 days.

METHOD

Nutritional[1]

AOAC
- Moisture
- Crude fat
- Proteins
- Ash
- Carbohydrates
- Fibre
- Energy

Texture [2]

TPA
- Hardness
- Adhesiveness
- Resilience
- Cohesiveness
- Elasticity
- Gumminess
- Chewability

RESULTS

Table 1 - Nutritional profile of *económicos* for 32 days incorporated with chestnut flour

		Moisture (g/100 g fw)	Crude Fat (g/100 g fw)	Proteins (g/100 g fw)	Ash (g/100 g fw)	Carbohydrates (g/100 g fw)	Fibre (g/100 g fw)	Energy (Kcal)	Energy (KJ)
Storage Time (ST)	0 Days	13.2±0.9b	0.160±0.009	18.1±0.8a	0.0100±0.0001a	69±1	0.04±0.03	348±4a	1456±15a
	11 Days	12.4±0.8a	0.165±0.008	18±2a,b	0.015±0.005b	69±2	0.04±0.02	351±3b	1468±14b
	18 Days	12.3±0.3a	0.16±0.01	18.8±1a,b	0.0100±0.0001a	69±1	0.03±0.01	351±1b	1471±6b
	25 Days	12.6±0.3a, b	0.16±0.01	18.9±0.9a,b	0.0100±0.0001a	68±1	0.04±0.01	350±1a,b	1465±5a,b
	32 Days	12.4±0.9a	0.160±0.009	20±1b	0.018±0.004c	67±2	0.03±0.02	351±3b	1469±14b
***p*-value (n=6)**	Student's T-test	0.006	0.559	0.041	<0.001	0.171	0.807	0.006	0.06
Flour Type (FT)	Control	13.1±0.6*	0.167±0.008*	19±1	0.014±0.05*	68±1*	0.04±0.02	348±2*	1457±10*
	Chestnut	12.1±0.5	0.155±0.005	19±1	0.011±0.003	69±1	0.04±0.01	352±2	1474±8
***p*-value (n=15)**	Student's T-test	<0.001	<0.001	0.447	0.001	0.010	0.706	<0.001	<0.001
ST×FT (n=30)	*p*-value	0.058	0.559	0.286	<0.001	0.431	0.899	0.056	0.056

Table 2 - Texture profile of *económicos* for 32 days incorporated with chestnut flour

		Hardness (g)	Adhesiveness (g/s)	Resilience (%)	Cohesiveness	Springiness (%)	Gumminess	Chewiness	Firmness (g*s)
Storage Time (ST)	0 Days	8380±712^{a}	-0.3±0.1^{b}	0.21±0.03	0.59±0.05	0.85±0.02	4896±293^{a}	4183±314^{a}	11494±1131
	11 Days	16962±2329^{b,c}	-1±1^{a}	0.21±0.02	0.57±0.04	0.79±0.02	9558±1147^{b}	7518±800^{b}	10516±3265
	18 Days	15223±392^{b}	-0.7±0.4^{a,b}	0.21±0.01	0.58±0.03	0.80±0.01	8847±380^{b}	7033±295^{b}	9842±2137
	25 Days	15823±2787^{b}	-0.5±0.3^{b}	0.21±0.02	0.59±0.03	0.79±0.03	9286±1606^{b}	7345±1385^{b}	11174±4275
	32 Days	21799±5748^{c}	-0.9±0.5^{a,b}	0.21±0.04	0.54±0.07	0.73±0.04	11774±3624^{b}	8646±2725^{b}	10987±5483
***p*-value (n=6)**	Student's T-test	<0.001	0.017	0.944	0.070	<0.001	<0.001	0.001	0.954
Flour Type (FT)	Control	14712±4859	-0.8±0.7	0.22±0.01	0.61±0.03*	0.81±0.03	8846±2642	7090±1918	11039±2628
	Chestnut	16563±5567	-0.6±0.5	0.20±0.02	0.54±0.04	0.77±0.05	8898±3137	6801±2152	10566±4104
***p*-value (n=15)**	Student's T-test	0.127	0.279	0.001	<0.001	<0.001	0.946	0.621	0.742
ST×FT (n=30)	*p*-value	0.962	0.238	0.623	0.605	0.043	0.999	0.995	0.832

In each row, different letters mean significant statistical differences, with an overall significance value of 0.05. The presented standard deviations were calculated from results obtained under different operational conditions. Therefore, these values should not be regarded as a measure of precision, rather as the range of the recorded values. The tables are presented after a two-way ANOVA to identify the contribution of each factor (ST and FT) independently.

- Carbohydrates and proteins - **most abundant nutrients**;
- Chestnut flour- **reduced the fat and moisture**, however **increased the caloric contribution** of the flours.
- **Over time** - harder and chewier;
- **Between the types of flour** - only cohesiveness was higher for the control sample.

CONCLUSIONS

- **Chestnut flour reduces the caloric contribution of the bread by reducing fat content and does not seem to have significant changes in the texture profile.**
- **Addition of 9% of chestnut flour for nutritional improvement does not seem to alter significantly.**

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