The perspective of nectarine fruit as a functional ingredient of puddings prepared with corn and rice starch

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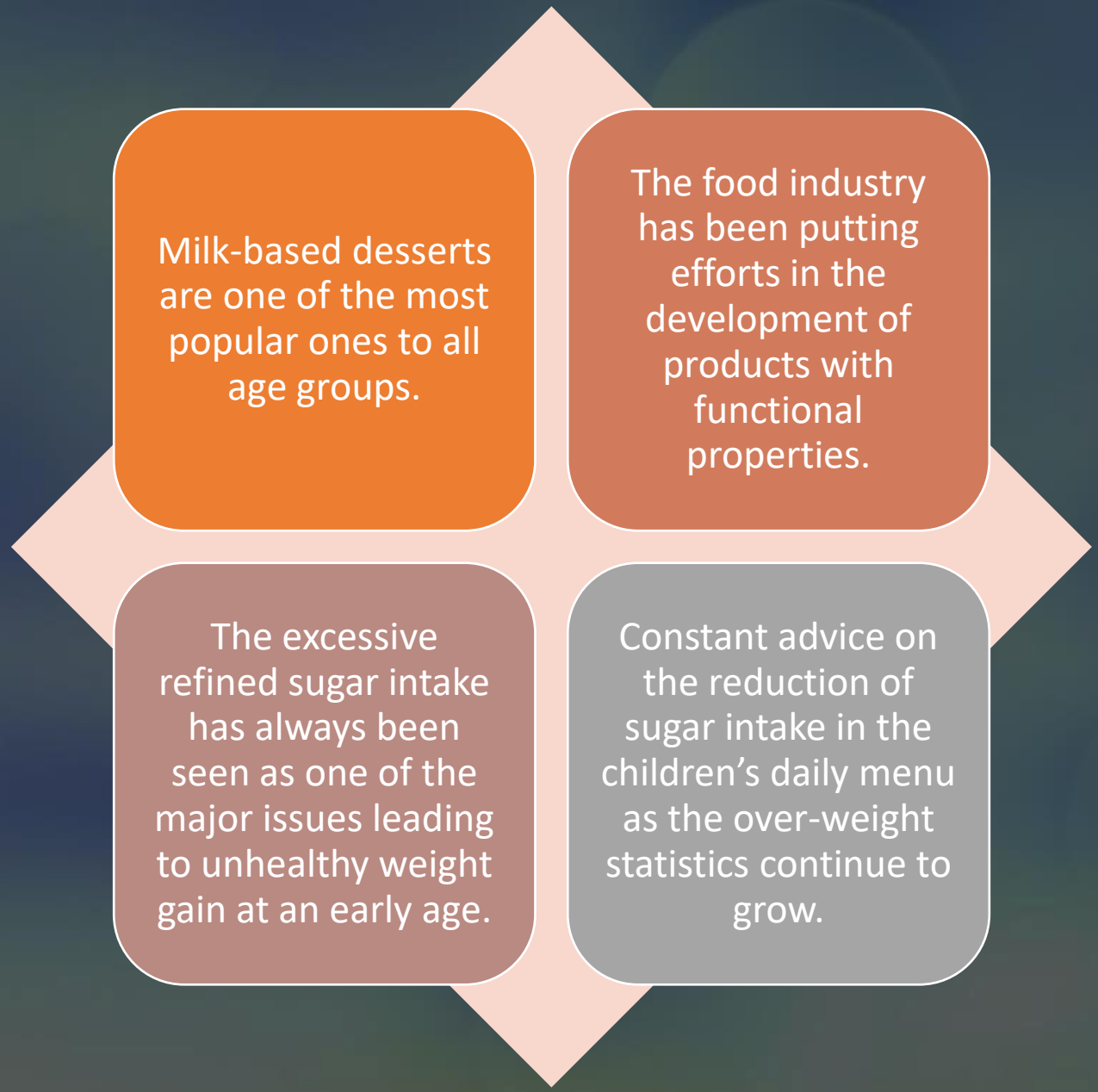
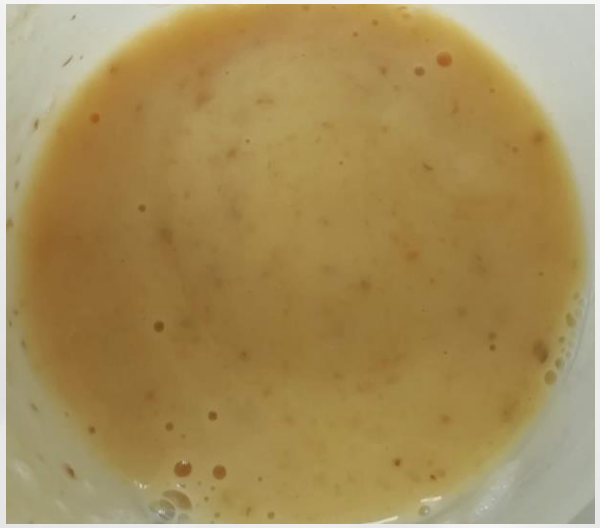
Introduction





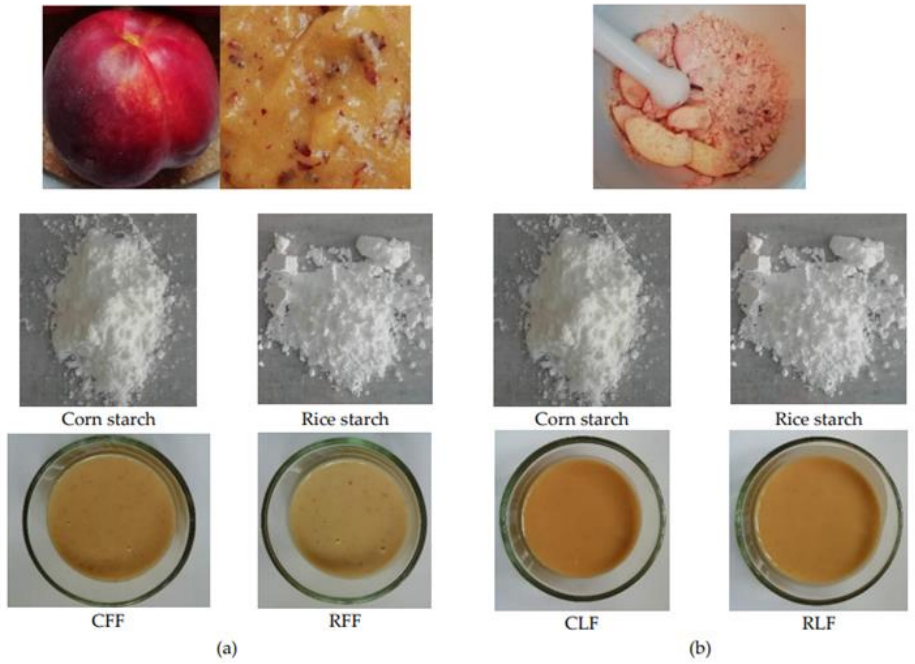
AIM

EVALUATE THE COMPLETE SUBSTITUTION OF SUGAR WITH NECTARINES AS LYOPHILIZED POWDER AND PURÉE, IN PUDDINGS PREPARED WITH CORN AND RICE STARCHES IN ORDER TO MEET THE NEEDS OF THE TRENDING HEALTHY LIFESTYLE AND DIET;

PHYSICAL, RHEOLOGICAL, NUTRITIONAL, AND SENSORY CHARACTERISTICS OF THE NECTARINE-ENRICHED PUDDINGS WERE USED TO DESCRIBE THE NEWLY DEVELOPED FORMULATIONS.

Preparation of formulations

Pudding formulations. (a) RFF – rice starch, peach purée; CFF – corn starch, peach purée; (b) RLF – rice starch, lyophilized fruit; CLF – corn starch, lyophilized fruit.



Type of pudding	Whole cow milk, %	Rice starch, %	Corn starch, %	Peach purée, %	Lyophilized peach powder, %
RFF	63	6	-	31	-
RLF	85	5	-	-	10
CFF	63	-	6	31	-
CLF	85	-	5	-	10

Methodology

Official AOAC methods were used to determine the moisture and ash content.

The nutritional data was determined by the calculation method.

Data were analyzed using MS Excel software. Relevant statistical analyses of the data were performed using one-way ANOVA and a Tukey–Kramer post hoc test ($\alpha = 0.05$). The Pearson's correlation coefficients between moisture content, density, aw and textural parameters have been plotted with the use of Excel STAT Cloud function in Microsoft Excel 365 software.

Results

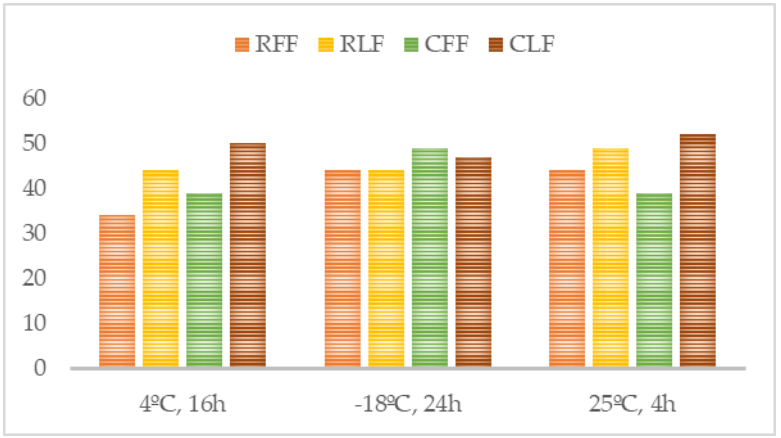
Puddings formulations	Ash content, %	Moisture content, %
RFF	0.75±0.01^{b}	83.21±0.06^{c}
RLF	0.93±0.01^{a}	75.76±0.06^{a}
CFF	0.74±0.03^{b}	80.65±0.06^{ab}
CLF	0.56±0.01^{c}	77.25±0.06^{b}

Pudding formulations, 100g	Proteins, g	Carbohydrates, g	Sugars, g	Fat, g	Monosaturated fats, g	Energy, kcal
RFF	2.31	10.38	3.04	2.14	1.24	70.0
RLF	3.11	13.29	4.71	3.02	1.67	93.6
CFF	2.22	10.32	3.04	2.13	1.23	69.0
CLF	3.03	13.24	4.71	3.01	1.66	93.0

Pudding formulations	L	a	b	c	h
RFF	69.20±4.86^{a}	2.88±0.30^{b}	19.48±1.52^{c}	19.70±1.45^{b}	81.50±1.44^{a}
RLF	58.11±1.39^{b}	6.72±0.22^{b}	24.32±0.72^{a}	25.24±0.64^{a}	74.54±0.89^{bc}
CFF	60.45±7.14^{b}	4.23±0.75^{c}	20.65±2.51^{b}	21.10±2.29^{b}	78.16±3.59^{ab}
CLF	56.24±1.63^{b}	7.62±0.11^{a}	26.54±2.12^{a}	27.62±2.06^{a}	73.93±1.06^{c}

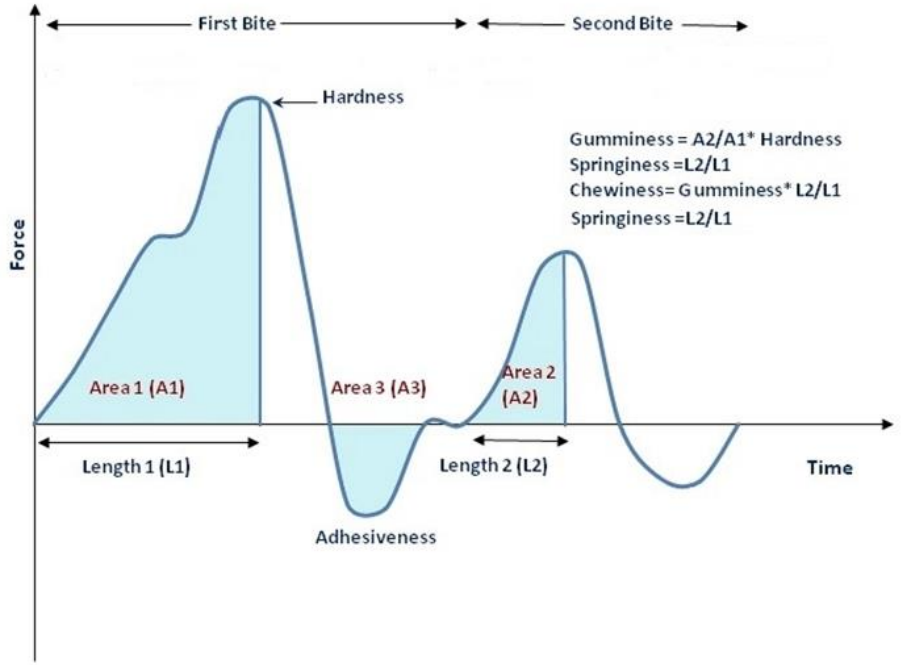
Results

Pudding formulations	Density, g/cm³	WHC, %	a_w
RFF	0.77±0.06[b]	15.56±2.25	0.947±0.001[a]
RLF	1.17±0.06[d]	0.49±0.19	0.956±0.001[c]
CFF	0.67±0.06[a]	22.54±3.15	0.953±0.001[b]
CLF	1.10±0.10[c]	3.66±0.53	0.958±0.001[bc]



Freeze-thaw stability of pudding formulations (RFF – rice starch, peach purée; RLF – rice starch, lyophilized fruit; CFF – corn starch, peach purée; CLF – corn starch, lyophilized fruit).

Results



Pudding formulations	Firmness, N	Cohesiveness	Gumminess, N	Springiness, mm	Chewiness, J
RFF	0.85±0.01^{a}	0.4±0.01^{a}	0.34±0.02^{a}	2.17±0.06^{a}	0.74±0.01^{a}
RLF	1.35±0.04^{d}	0.51±0.01^{b}	0.84±0.02^{d}	3.47±0.01^{cd}	2.91±0.06^{d}
CFF	0.94±0.03^{b}	0.57±0.02^{b}	0.48±0.02^{b}	2.59±0.03^{b}	1.24±0.01^{b}
CLF	1.12±0.06^{c}	0.62±0.05^{c}	0.64±0.03^{c}	3.18±0.04^{c}	2.04±0.05^{c}

Results

Pudding formulations	Color			Aroma			Consistency			Taste		
	Orange	Brown	Milky	Starchy	Fruity	Flowy	Creamy	Grainy	Thick	Sweet	Milky	Fruity
RFF	4.5±1.27^{c}	5.5±1.35^{b}	3.1±1.19^{a}	2.2±1.03^{a}	6.7±0.94^{b}	6.2±1.39^{a}	7.3±0.94^{b}	2.2±0.63^{c}	4.5±1.08^{a}	7.1±0.99^{a}	4.3±1.88^{a}	8.5±1.08^{a}
RLF	8.6±1.07^{a}	8.8±0.92^{a}	2.7±1.15^{c}	2.7±1.16^{a}	9.0±1.15^{a}	6.1±1.19^{a}	8.8±1.03^{a}	8.2±0.78^{a}	3.4±1.42^{a}	7.5±1.08^{a}	4.5±1.58^{a}	9.6±1.17^{a}
CFF	6.9±0.99^{b}	8.1±1.37^{a}	2.8±1.03^{c}	2.6±1.17^{a}	7.5±0.97^{b}	6.9±1.19^{a}	9.7±0.95^{a}	3.8±2.15^{b}	3.3±1.63^{a}	8.0±1.25^{a}	4.1±1.85^{a}	8.8±0.92^{a}
CLF	8.0±1.05^{ab}	7.4±1.07^{a}	4.5±0.97^{b}	2.5±1.26^{a}	9.5±0.85^{a}	6.6±1.51^{a}	9.8±0.78^{a}	8.5±1.08^{a}	3.4±1.65^{a}	7.7±1.25^{a}	4.3±1.71^{a}	8.2±1.68^{a}

Conclusion

- The effect of total sugar substitution in pudding recipes has been evaluated in order to meet the recent necessity of reduced sugar intake and healthier nutrition in general.
- Further exploration of the perspective of fruit-enriched puddings should be made in order to improve their technological and health-promoting properties.

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