

Consumer perception of strawberry yoghurts with gradually reduced sugar content

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Introduction

Sugar reduction especially in foods consumed often on a daily basis such as flavored yoghurts is an important health issue since many years. The primary interest of the present study was the transferability of distinct sugar reduction steps (just noticeable differences, JND) determined by a trained panel on sensory differences of sugar reduced strawberry yoghurts perceived by consumers.

Material and Methods

Yoghurt production

Yoghurt samples were prepared following the Agroscope production protocol for stirred yoghurts

- Standardization of milk fat (3.5%) and protein concentration (4%, addition of Promilk 600, Crema, CH).
- Starter culture: YL-L811, Chr. Hansen, Denmark.
- fermentation stop at pH 4.6
- Strawberry fruit mass: Frulino, Frutarom, CH (58% sucrose).
- Constant ratio white mass to strawberry fruit mass (10.6:1) to keep a constant aroma level
- Constant linear reduction steps of sucrose concentration
- Yoghurt were stored for a week at 4°C prior to sensory evaluation

Sensory test protocol

209 participants (107 female, 102 male) regularly consuming strawberry yoghurt

Perception of sugar reduction

A/not A test (incomplete design)

A Sample: Reference strawberry yoghurt (6% or 9% added sugar)

Coded samples set: three sugar reduced samples corresponding to half, exact and twice the JND determined by a trained panel as well as reference yoghurt (sample A).

Each participant judged 3 codes samples on both sugar levels.

Hedonic aspects of reference yoghurts (6% and 9% sugar)

9-point scale to measure liking and 7-point scale for just about right (JAR) judgements of the attributes sweetness, acidity and strawberry flavour.

Results and discussion

A/not A Test

	Reference yoghurt 6% sugar			Reference yoghurt 9% sugar		
	Sugar reduction by			Sugar reduction by		
	0.5 JND	JND	2 JND	0.5 JND	JND	2 JND
Saccharose reduction (g)	0.1875	0.375	0.75	0.25	0.625	1.25
number of participants	114	109	101	125	109	125
Number of corrects answers	57	52	44	67	52	67
C ² value	0.19	0.04	1.44	2.28	0.92	3.54
p value	0.661	0.846	0.231	0.131	0.338	0.06

Table 1: Results of the A/not A Test for sugar reduced strawberry yoghurts compared to reference yoghurts with 6% and 9% sugar respectively.

No significant difference between samples containing the initial sugar concentration (sample A) and samples with reduced sugar levels (0.5 JND, JND and 2 JND) was perceived on both sugar concentration levels (6%, 9%).

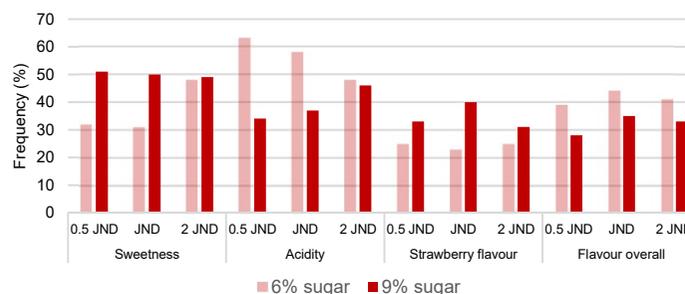


Figure 1: Perceived qualitative differences (%) for samples correctly identified as different from the reference yoghurt (A sample) (multiple answers possible)

Test persons who correctly identified the sugar reduced samples primarily attributed the perceived difference to sweetness (samples with 9% sugar) and sourness (samples with 6% sugar), indicating that sourness dominated over sweetness perception at the lower (6%) sugar level.

Conclusions

- The observed results confirmed that it can be assumed that a sugar reduction corresponding to the difference threshold determined with the trained panel is not perceived by consumers
- As expected a sugar reduction was linked to a loss in perceived sweetness intensity but also to a distinct loss of strawberry flavour which significantly influenced the liking of the yoghurt
- Balance between perceived sweetness, acidity and flavour is supposed to be crucial for consumer acceptance

Hedonic aspects

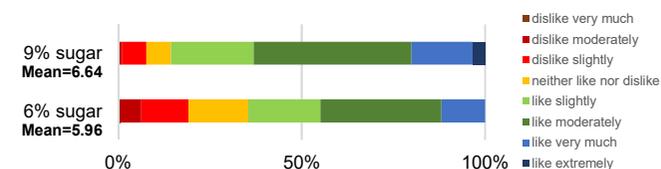


Figure 2: Frequency distribution (%) of liking scores and mean value of strawberry yoghurt with 6% and 9% sugar (participants did not use the category «dislike extremely»)

Yoghurt with 9% sugar was significantly (p=0.05) more liked than the sample with 6% sugar.

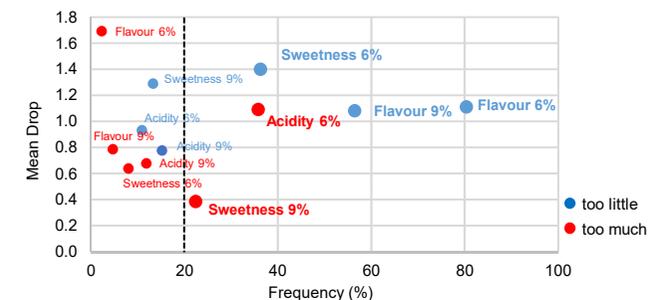


Figure 3: Results of penalty analysis with the attributes sweetness, acidity and flavour (threshold for population size 20%)

On both sugar levels participants significantly (p=0.05) penalized the product when it was judged as not aromatic enough (mean drops = app.1). Significant penalty (p=0,05) of the yoghurt with 6% was due to a too high acidity and a too low sweetness intensity (mean drop of 1.1 and 1.3 respectively).