Utilizing Different Outcomes from TDS to Characterize Artificial Sweetener Aftertaste in a Cola Beverage

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Introduction

- Although consumption of artificially sweetened products has increased due to health and wellness concerns, some consumers continue to reject diet products presumably due to perceived off-notes in aftertaste.
- Understanding these negative characteristics is not an easy task due to:
  1. Consumer differences in sensitivity to artificial sweeteners.
  2. Difficulties in characterizing the aftertaste.

Objective: Characterize sensory attributes that contribute to the sensory temporal profiles of artificial and natural sweeteners. This study focuses on differentiating the aftertaste sensations elicited by natural and artificial sweeteners in a cola beverage.

Materials & Methods

- Products evaluated:
  - Cola with High Fructose Corn Syrup
  - Cola with blend Asp/ AceK
- Sensory temporal profiles: TDS
  - The aim of Temporal Dominance of Sensation method is to give a global temporal picture of a product by allowing the panelist to score several descriptors simultaneously.
  - 12 panelists sensitive to the different sweeteners
  - 5 repetitions
  - "Score the perceived intensity only for the dominant attribute during the length of time it is perceived as dominant".
  - Test duration: 4min after swallowing

Results

Absolute dominance profiles



Figure 1. HFCS dominance profile



Figure 2. Aspartame/AceK blend dominance profile

Relative dominance profiles

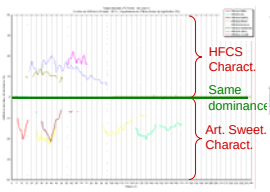

Figure 3. Relative profile HFCS versus Asp/AceK blend. (significant points at p=5%)



Figure 4. Dominance profile for all products for the descriptor earthy.

Statistical significance on TDS parameters

Attribut	bitter		dry		earthy		lemon	
Parameter	Score	Duration	Score	Duration	Score	Duration	Score	
HFCS	13.38	22.24	17.67	3.1	5.48	14.86	23.29	
Aspartame/AceK	23.44	38.77	28.95	11.39	13.6	2.91	6.26	
Proba.	0.0134 *	0.0211 *	0.0120 *	0.0061 **	0.0084 **	0.0003***	<0.0001***	

Attribut	licorice		medicinal	spicy	
Parameter	Duration	Score	Score	Duration	Score
HFCS	14.66	19.96	12.19	7.22	18.48
Aspartame/AceK	33	38.96	22.01	2.67	6.72
Proba.	0.0100 **	<0.0001***	0.0265 *	0.0168 *	0.0045 **

Figure 5. Significant results from the Student tests in between HFCS and Asp/AceK blend samples on TDS parameters (Time of the first apparition of a perception, duration of this perception and intensity score).

Outcomes I

- The total duration of the blend aftertaste lasts longer (3min) than the HFCS one (2min).
- Most of the panelists perceived sweet as dominant in the HFCS cola for about 2minutes.
- For the Asp/AceK cola, the first dominant impact is sweet but it is rapidly followed after 30 seconds by a licorice taste. Then, from 50 seconds to almost 3 minutes, a dryness sensation is perceived as mainly dominant.

Outcomes II

- Some lemon and spicy dominant notes are missing in the blend compared to HFCS.
- More people feel the bitter note as dominant at 1st impact in the blend cola whereas they perceive it a little later in HFCS.
- The earthy note is more dominant after 30 seconds and is characteristic of the blend cola compared to HFCS.

Outcomes III

- Intensity scores and durations are significantly higher for the perceived dominant sensations of dryness, earthy and licorice in the blend cola.
- Bitterness and medicinal dominances have equal duration for the two samples but scored higher in intensity the blend cola.
- On the contrary, HFCS has higher scores and higher duration for the dominant perceptions of lemon and spicy.

Summary & Conclusions

- The various outcomes from the TDS methodology provide information to characterize differences between artificial sweeteners and HFCS colas.
- Study objectives will dictate which outcome(s) provide the most useful information:
  - ➢ Absolute dominance profiles provide the sequence of dominance of the product.
  - ➢ Relative dominance profiles focus on comparing the dominance rates of products.
  - ➢ Information regarding intensity scores can only be provided by statistical tests, making them critical.