

Exploring dynamics of sensory attributes and emotions during consumption of chocolate containing maltitol applying TDS and TDE methods

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Introduction

Chocolate is a popular snack but it is also a very energy-rich food. The sugar substitute maltitol showed 50-90% of the sweetening power of sucrose, but its energy only amounts to 3 kcal/g. Therefore, replacing sucrose with maltitol in chocolate might be considered as an important approach to reducing the total sugar consumption.

The presented study focused on the question whether replacement of sucrose with maltitol influences the sensory and emotional temporal profile of milk or dark chocolate.

Materials & Methods

Applying Temporal Dominance of Sensations (TDS) and Temporal Dominance of Emotions (TDE) methods, forty-four untrained individuals evaluated six sensory attributes and six emotion terms, relevant for chocolate description, selected by using the check-all-that-apply method (CATA), during a testing time of 90 seconds.

Results

As evidenced by TDS curves, the temporal profiles of dark chocolate were dominated by bitterness and cocoa flavor (Fig. 1 and Fig. 2) whereas those of milk chocolate were characterized by sweetness and milky flavor independent of sweetener (Fig. 3 and Fig. 4).

However, bitterness (max. DR=55.6% vs. 48.9%) and cocoa flavor (max. DR=48.9% vs. 42.2%) in the dark chocolate with maltitol reached a higher dominance rate (DR) than in the chocolate with sucrose. The milky flavor in the milk chocolate with maltitol showed a higher dominance rate (max. DR=49.9%) and was perceived as dominant over a longer period of time in comparison to the sample with sucrose (max. DR=42.2%). The max. dominance rate of sweetness was comparable in both samples (DR%=42.2% vs. 40%), but in the chocolate with sucrose sweet taste dominated several times during the entire evaluation.

The results of the TDE curves allow concluding that independent of the type of sweetener at the beginning of the evaluation dark chocolate was mainly dominated by the emotion interested (Fig. 5 and Fig. 6) and milk chocolate by the emotion satisfied (Fig. 7 and Fig. 8), while at the end of the testing both kinds of samples were associated with the term calm.

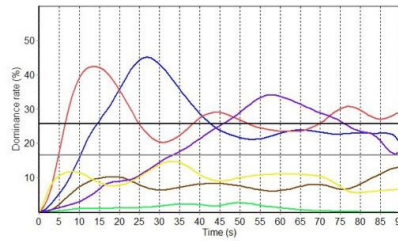


Fig. 1: TDS profile of the dark chocolate with maltitol

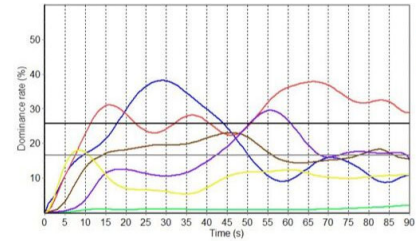


Fig. 2: TDS profile of the dark chocolate with sucrose

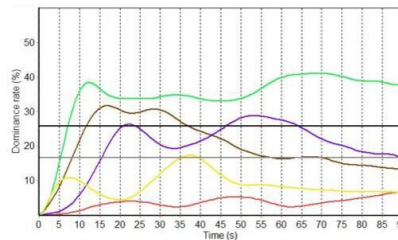


Fig. 3: TDS profile of the milk chocolate with maltitol

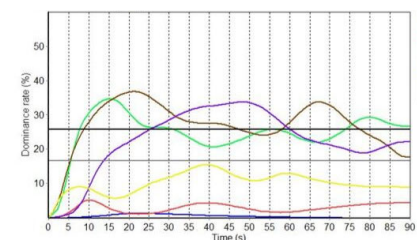


Fig. 4: TDS profile of the milk chocolate with sucrose

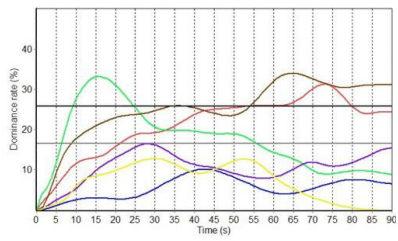


Fig. 5: TDE profile of the dark chocolate with maltitol

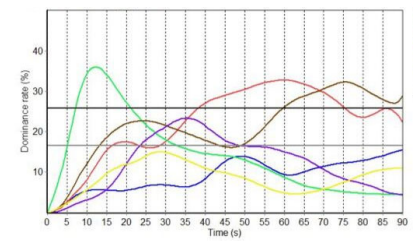


Fig. 6: TDE profile of the dark chocolate with sucrose

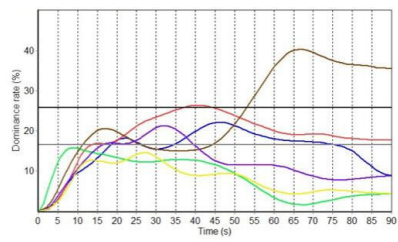


Fig. 7: TDE profile of the milk chocolate with maltitol

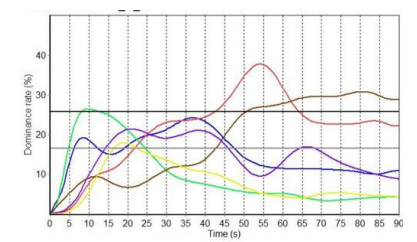


Fig. 8: TDE profile of the milk chocolate with sucrose

Selected emotions for TDE

- happy
- satisfied
- interested
- calm
- feel comfortable
- nostalgic
- Chance Level
- Level of Significance (5%)

Selected attributes for TDS

- bitter
- cacao
- milky
- sweet
- melting
- smooth
- Chance Level
- Level of Significance (5%)

Conclusion

According to our findings, the use of maltitol instead of sucrose in the production of chocolate does not affect the perception of the main attributes of the product and it showed no impact on the chocolate associated emotions. Thus, maltitol may serve as an alternative sweetener in the production of low-calorie chocolate with a potential to increase the milky flavor in milk chocolate.