

Impact of cocoa contents(%) on consumers acceptance of dark origin and non-origin chocolates

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Background

Bitter taste and astringency potentially limit consumers' acceptance of chocolates with higher cocoa contents (%cc). In order to identify potential drivers of liking, a consumer survey was conducted in the present study evaluating individual product acceptance.

Materials and methods

Consumers acceptability of 5 commercial dark origin (OR; 66.8-80.1%cc) and 6 non-origin (N-OR; 54.5-80.0%cc) chocolates with different cocoa contents and a high-polyphenol* chocolate (N-OR 65.0%cc*) were evaluated using a 9-point hedonic scale.

In order to gain better insight in consumers' choices, the temporality of bitterness and astringency as well as sweet taste (potential covering agent) were investigated during the tasting period (mastication, aftertaste) applying Temporal Dominance of Sensations (TDS).

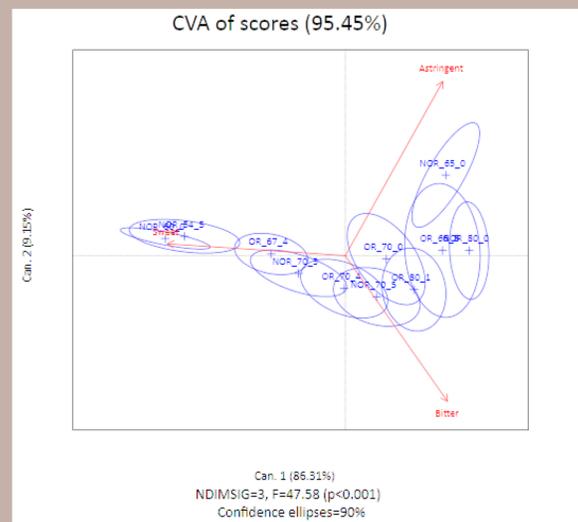
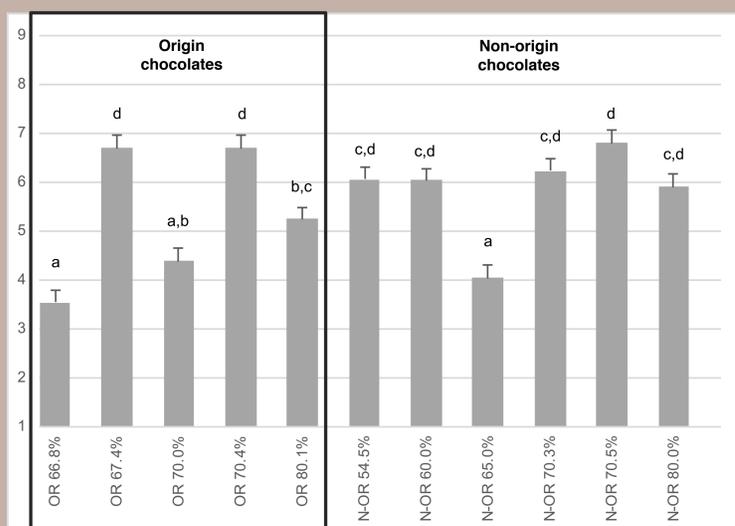


Fig. 5: Canonical Variate Analysis (CVA) of the duration of dominance for bitterness, astringency and sweetness in all evaluated OR and N-OR chocolate samples.



Different letters identify product groups according to Sidak post hoc test.

Fig. 1: Overall acceptance of origin (OR) and non-origin (N-OR) chocolates on a 9-point hedonic scale

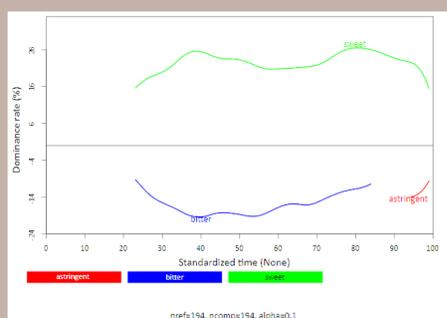


Fig. 2: TDS difference curves - N-OR vs. OR chocolates.

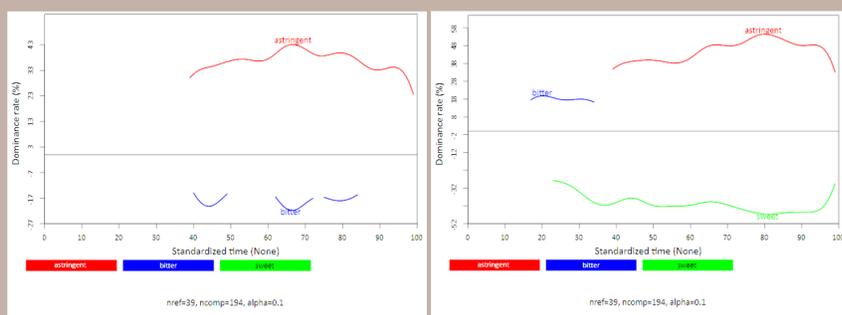


Fig. 3: TDS difference curves - N-OR 65.0%cc* vs. all evaluated OR chocolates.

Fig. 4: TDS difference curves - N-OR 65.0%cc* vs. all evaluated N-OR chocolates.

Results

As evidenced by TDS difference curves, the temporal profiles of OR chocolates were dominated by bitter taste (mastication period) and an astringent mouthfeel (aftertaste) independent of %cc (Fig. 2, 5). Thus, only weak correlations were found between the duration of dominant sensations in bitterness, astringency and sweetness and %cc ($r = 0.443, p = 0.089$; $r = -0.160, p = 0.324$ and $r = -0.419, p = 0.103$, respectively). In comparison, N-OR chocolates were characterized by dominant sweetness along the entire tasting period (Fig. 2, 5). Cocoa content (%) were shown to affect the dominance duration of all three investigated attributes ($r = 0.892, p < 0.001$; $r = 0.444, p = 0.089$ and $r = -0.802, p < 0.001$ for bitterness, astringency and sweetness, respectively). Without the high-polyphenol sample N-OR 65.0%, correlation coefficients change as follows: $r = 0.727, p < 0.001$; $r = 0.628, p < 0.001$ and $r = -0.831, p < 0.001$ (for bitterness, astringency and sweetness, respectively). Differences between N-OR 65.0% and OR or N-OR are highlighted in Fig. 3 or 4, respectively.

Whereas the persistence of dominant sweet and bitter sensations had no significant ($p > 0.05$) impact on consumers acceptance, a strong significant ($p < 0.05$) negative correlation was observed between the dominance duration of astringency and acceptability in both, OR and N-OR chocolates ($r = -0.998$ and $r = -0.799$, respectively).

Interestingly, %cc did not influence consumers acceptance of both types of evaluated dark chocolates significantly ($r = 0.039$ and $r = 0.046$ for OR and N-OR chocolates, respectively).

Conclusion

The results indicate a strong influence of cocoa quality and local conditions on the temporal profile of OR and N-OR chocolates in addition to %cc. Consumers acceptance was driven by balanced sweet- and bitterness dominances. Persistent astringency elicited strong negative consumer responses, whereas %cc had no impact at all.

