

Preliminary Vocabulary Development and Application on Dark Chocolate

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Introduction

Dark chocolate is a popular sweet snack product. High quality in dark chocolate is associated with certain flavor attributes, such as bitter taste, cocoa and sweet aromatics, but also with texture attributes, such as melting rate, hardness, and smoothness. The aim of the study was to create a preliminary vocabulary for chocolate and to apply the vocabulary in comparison of dark chocolate samples manufactured in three countries (Latvia, Estonia, and Finland).

Materials and Methods

The vocabulary was composed by trained panelists using a selection of chocolates. The samples (Table 1) were characterized by their flavor (n=11), aroma (n=8), appearance (n=4), and texture (n=6) attributes (Table 2). The vocabulary was applied in evaluation of locally manufactured Finnish, Estonian, and Latvian products.

Results and Discussion

The texture of the products was similar in crumbliness and varied in hardness, residual mouthcoating, roughness, and melting rate (Figure 1). There were differences in cocoa flavor, sweet, sour, and bitter taste. The Latvian product was slightly elevated in attributes such as sourness, bitterness, and astringency. This may have been caused by the higher percentage of cocoa in the Latvian product formulation. The Estonian product was lower in sweet taste. The Finnish product had low levels bitter and cocoa flavor.

The use of the developed vocabulary helped detect differences among the studied products. Variation in flavor and texture may be caused by several factors, such as cocoa genotype, environmental factors and processing technologies (Afoakwa et al., 2008). A larger number of locally manufactured products should be studied to determine whether the flavor profiles are unique by countries and to further develop the vocabulary.

References

Afoakwa, E.O., Paterson, A., Fowler, M., Ryan, A. 2008. Flavor formation and character in cocoa and chocolate: A critical review. Critical Reviews in Food Science and Nutrition, 48: 840-857.

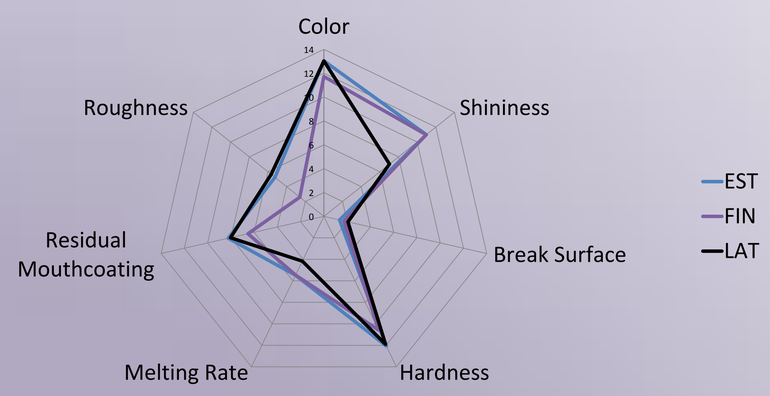

Figure 1. Significant differences in appearance and texture attributes.

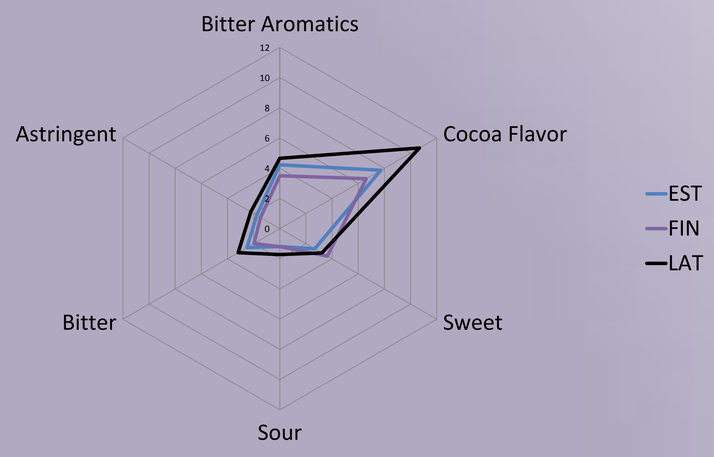

Figure 2. Significant differences in aroma and flavor attributes.

Table 1. Composition and ingredients of the samples.

Sample	Energy kcal/100g	Protein g/100g	Carbohydrates g/100g	Lipids g/100g	Cocoa mass%	Ingredients
EST	520	7	51	32	56	Sugar, Cocoa mass, cocoa butter, cocoa powder, emulsifier (soy lecithin)
FIN	514	4.9	53	31	49	Sugar, cocoa mass, cocoa butter, emulsifier (soy lecithin)
LAT	521	9.7	34.4	38.3	70	Cocoa mass, sugar, reduced fat cocoa powder, cocoa butter, emulsifier (soy lecithin), flavor (vanillin)

Table 2 Appearance, texture, flavor, and aroma attributes used in the study.

Attribute	Definition
Appearance	
Color	Color tone measured by comparison with color charts.
Shininess	Sample surface shine from dull to shiny.
Bloom	Amount of bloom (cocoa fat crystallization) on product surface
Break surface	Visual unevenness of sample after breaking from smooth to uneven.
Texture	
Crispness	Pitch of the sound that is caused by breaking 2 pieces apart
Hardness	Force necessary to bite through the sample
Crumbliness	Amount of particles created by biting through the sample
Melting rate	The time it takes for the sample to melt in mouth
Residual mouthcoating	The amount of residual in mouth after swallowing
Roughness	The mount of small particles in melted chocolate from smooth to sandy and gritty
Flavor	Evaluated retronasally
Chocolate ID	Milk chocolate characteristics such as sweet, dairy, and cocoa flavor
Cocoa	Cocoa flavor intensity
Caramel	Heated/scorched sugar flavor intensity
Vanillin	Sweet flavor characteristic to vanillin
Sweet	Basic taste characterized by sucrose solution
Sour	Basic taste characterized by citric acid solution
Bitter	Basic taste characterized by caffeine solution
Astringent	Mouthfeeling characterized by alum solution
Stale	Off-flavor that indicates end of shelf-life or contamination with other materials
Rancid	Off-flavor that indicates end of shlef life and fatty acid oxidation
Metallic	Mouthfeeling characterized by Ferric sulfate solution
Aroma	Evaluated orthonasally
Chocolate	Characteristic mixture of bitter and cocoa aromatics
Roasted	Aromatics that indicate the level of roasting of the cocoa beans
Sweet	Sweet aromatics complex, including vanillin
Bitter	Bitter aromatics complex
Cocoa	Cocoa aroma intensity
Stale	Off-aroma that indicates presence of other materials
Rancid	Off-aroma that indicates oxidation processes
Technological	Off-aroma that indicates a technological process, metal-related

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