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The Evaluation of the Textural and Sensorial Properties of Chocolate Dairy Dessert

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ABSTRACT

The objective of this study was to characterize the textural, sensorial and color properties of chocolate dairy dessert. To verify properties of these products, random samples were collected from industrial and artisanal manufactures in Bursa. Instrumental texture analyses for hardness, adhesiveness, cohesiveness, springiness, gumminess, chewiness and resilience were carried out. The five-point hedonic scale was used to measure acceptance-preference of product by trained panelists. The color, texture and sensory analyses indicated that the chocolate dairy dessert made using artisanal methods presented distinct characteristics than industrial methods.

Keywords: *Chocolate dairy dessert, texture, sensory, consumer acceptability.*

INTRODUCTION

Nowadays, people are being more interested in dessert consumption along with the rapid change in popular life style and eating habits. Concerning consumer preferences, a pleasant taste and an attractive texture are essential key parameters for acceptability of a dairy dessert. Dairy desserts have important contributions to daily diet as being a major source of calcium and vitamin D, and also phosphorus, potassium, magnesium, riboflavin, niacin, essential fatty acids and protein (Akpinar-Bayizit et al, 2009; Abdel-Latif and Saad, 2016).

Dairy desserts exist in a broad variety of products. They are prepared with various formulations which are widely appreciated by consumers. They can be formulated with several traditional and/or innovative additives. These ingredients result in a wide variety of textures aside with nutritional, physical, and sensory characteristics that interact directly with consumer acceptability and technological properties. The knowledge of the textural and sensorial properties during shelf life is another key parameter for consumer preference of dairy desserts since the predicted shelf life is generally related to organoleptic characteristics (Akpinar-Bayizit et al., 2009; Arcia et al., 2011; Celeghin et al., 2016; Estevam et al., 2017).

Knowledge of the textural properties of dairy desserts during storage is critical since the shelf life depends on maintaining the desired physical, chemical and sensory quality characteristics throughout storage. Instrumental texture profile analysis (TPA) have been extensively studied used to evaluate textural properties of desserts, which play an important role on sensory perception and consumers' acceptance (Ares et al., 2010; Alamprese and Mariotti, 2011; Gonzalez-Tomas and Costell, 2006; Tarrega and Castell, 2007; Abdo Qasem et al., 2017).

It is necessary for the manufacturers to apply sensory and textural techniques to interpret the consumer responses for quality and preference. Consequently, sensory and texture evaluation of chocolate dessert can contribute, either directly or indirectly, tost and ardization process, cost reduction, product formulation, determination of consumers' preferences, and quality maintenance (Imram, 1999; El-Gendi Marwa and El-Shreef Lamiaa, 2013).

The chocolate dairy dessert namely "chocolate pudding" is made from milk, plain flour, cocoa powder, sugar, vanilla extract and butter or margarine. It is preferred mostly by children and youngsters. In Turkey, chocolate dessert is manufactured either at small-scale with

artisanal/traditional methods by factories or pastries or large-scale with mechanized processes. The traditional manufacturing is foremost based on empirical knowledge and experience passed on from one generation to another, and thus results in variations in physicochemical, textural and sensorial properties of the final products. Since the main quality parameters that directly link to consumers' acceptance are the sensorial and textural properties like viscosity, sweetness and taste, combining traditional production methods with the advantages of the technological improvements could offer consumers higher levels of quality for chocolate dessert (Morais et al., 2014).

The main objective of this study was to evaluate the textural, sensorial and color properties of chocolate dairy desserts obtained from different producers and to understand the correlation between texture and sensorial characteristics for consumer preference.

Materials and Methods

The samples were purchased from various artisanal (n=24) and industrial (n=8) manufacturers. The desserts, purchased in their original plastic or glass packages depending on the manufacturer, were held at 4ºC until further analysis.

Instrumental Texture Analysis

Textural properties of samples were evaluated instrumentally using a texture analyzer TA-XT Plus (Stable Micro System Ltd, Model TA-XT plus, Surrey, UK).Before textural analysis, the samples were left at room temperature (25oC). Textural attributes were determined by TPA method fitted with a 5 kg load cell. A 20-mm-diameter cylinder probe was used to measure the texture profile of dessert and penetrated the samples to 75% of their original depth. The speed of the probe was fixed at 0.1 mm/s during the pretest compression and relaxation of the samples. The distance of penetration from the surface of sample was set at 20 mm. Parameters like hardness, adhesiveness, cohesiveness, springiness, gumminess, chewiness and resilience were calculated using the Texture Expert Exceed software (v 2.55) extracted from the resulting force time curves. All measurements were carried out in triplicates.

Instrumental Color Analysis

Instrumental color analysis of pudding samples was performed by using a Minolta Chromameter (Konica Minolta Co., Ltd., Osaka, Japan) calibrated with white calibration plate as specified by the manufacturer.

Sensory Analysis

Sensory evaluation of samples was conducted by a panel of seven trained panelists, specifically selected on the basis of their interest and experience in sensory evaluation of dairy products. Samples were removed from the refrigerator (4±2˚C) 1 h prior to sensory evaluation and kept at room temperature (22±2˚C). All samples were presented in three random numbers and served with a glass of water for mouth rinsing between samples. The five-point hedonic scale (1 = dislike extremely, 3 = neither like nor dislike, 5 = like extremely) was used to measure acceptance-preference of the product. All the samples were evaluated for sensory attributes such as color and appearance, odor, body and texture, taste, sweetness, cocoa ratio and overall acceptability.

Statistical Analyses

The results obtained from texture, color and sensory analysis were statistically analyzed by one way analysis of variance (ANOVA) in order to observe differences between artisanal and industrial manufacturers.

Results And Discussion

Textural Properties

The textural properties of samples obtained in this study have been depicted in Table 1. In this study, all textural parameters (hardness, adhesiveness, cohesiveness, springiness, gumminess, chewiness and resilience) were found significantly different within the dessert samples. Based on the data presented, it can be confirmed that the higher values of textural properties were found for samples from artisanal manufacturers.

Table1. *Textural properties of chocolate dairy dessert*

Parameters	Industrial Manufacturers	Artisanal Manufacturers	Level of Significance
Hardness, (g)	125.91±26.746	188.98±24.260	**
Adhesiveness (gs)	-108.39±28.844	-155.30±15.435	**
Gumminess (g)	89.24±19.182	129.76±12.284	**
Chewiness, Nmm	79.17±13.893	119.09±19.581	**
Cohesiveness	1.22±0.085	0.75±0.003	**

Springiness (mm)	0.89±0.069	1.40±0.057	**
Resilience	0.22±0.112	1.37±0.046	**
**Significant at P<0.01			

Color Properties

Color is an important attribute for foods because it can increase or decrease their acceptability by consumers (Goldberg et al., 2012). The color analysis results were shown in Figure 1. In the CIELab color scale, the L* parameter ranges from 0 to 100, indicating the color variation (brightness) from black to white; the a* axis shows the variation from red (+a) to green (−a); and the b* axis shows the variation from yellow (+b) to blue (−b).L* (Lightness),

Although the responses for the color attributes showed no significant differences (P>0.01),the a* and the b* values of industrial samples were slightly higher than the artisanal samples. The differences observed in chocolate dessert samples were mainly dependent onthe ingredients, formulation and manufacturing conditions.

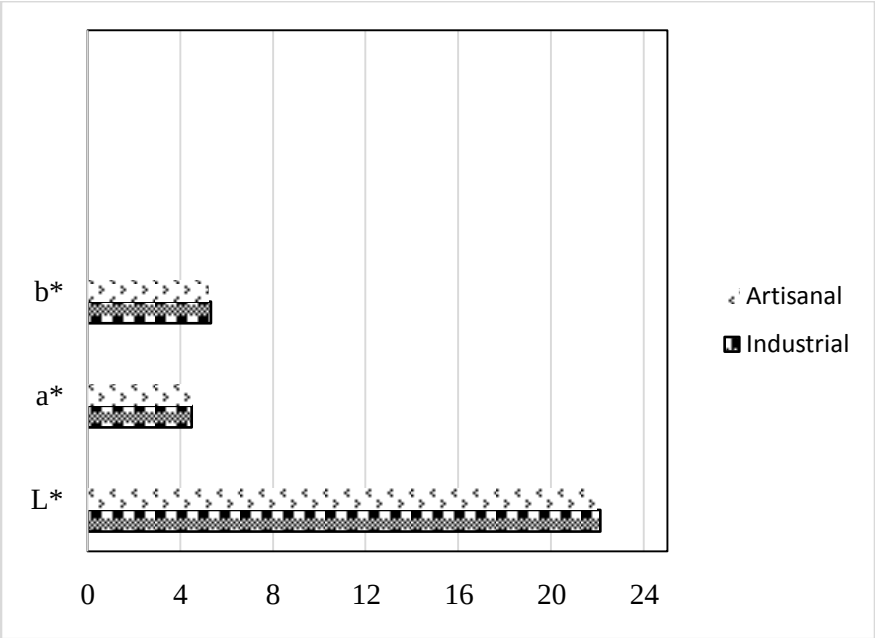

Figure 1.*Color values of chocolate dairy dessert*

Sensorial properties

Sensory evaluation has a great influence on consumer preference as it helps to improve the organoleptic attributes of a product, including appearance, flavor and texture. In addition, it can also provide the development technologist with useful information in order to achieve and control quality, at a level which is particularly acceptable to the consumers (Celeghin et al. 2016). The results of the sensory evaluation are shown in Table 2. Graphical representation of the sensory attributes evaluated through the acceptance is presented in Figure 2. Based on the evaluation significant differences (P<0.01) were observed among the sensory properties of the samples. In general, industrial dessert samples received the highest scores for all of sensorial properties.

Table 2.*Sensorial properties of chocolate dairy dessert*

Parameters	Industrial Manufacturers	Artisanal Manufacturers	Level of Significance
Color and appearance	4.81±0.460	4.56±0.564	**
Odor	4.85±0.233	4.49±0.577	**
Body and texture	4.74±0.448	4.30±0.819	**
Taste and Flavor	4.59±0.529	4.13±0.866	**
Sweetness	4.59±0.489	4.18±0.739	**
Cacao ratio	4.61±0.544	4.16±0.879	**
Overall Acceptability	4.58±0.485	4.23±0.749	**
**Significant at P<0.01			

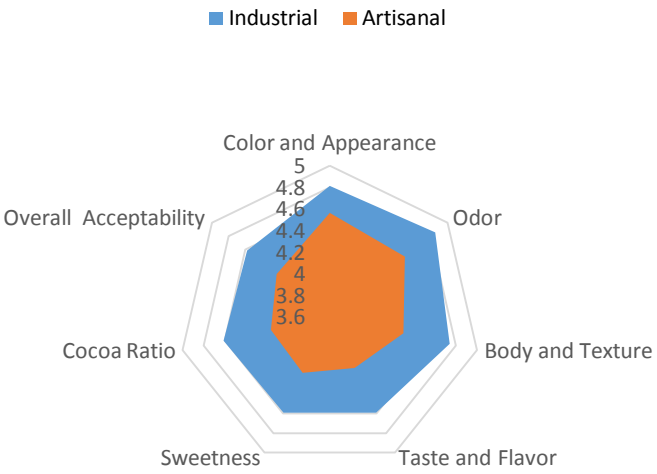

Figure2. *Graphical representation of the sensory analysis*

CONCLUSION

Due to its nutritional value and unique taste, chocolate dairy dessert has become a common dessert choice and a delicious alternative to ice cream for people, in particular children and youngsters. The consumers' preference for chocolate dessert depends on its noteworthy flavor, taste, and excellent texture. The sensorial and textural quality is based mainly upon the ingredients used in the mix, which include milk, sugar, cacao and a thickening agent as well as the method of production. The results of color, textural and sensorial analyses indicated that chocolate dairy dessert obtained from different producers presented distinct characteristics. The study indicated that manufacturers who seek to improve the quality of dessert should rather focus on standardization of the manufacturing processes.This information will be useful to understand the similarities and differences of manufacturing methods in order to meet consumers' expectations aside with enhancing the market share of dairy desserts. Consequently, the sensorial evaluation approach could assist the food industry in designing new dairy-based product with nutritional and technological characteristics that meet consumer demands.

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