STUDY ON THE ASSESSMENT OF THE QUALITY OF SOME CHOCOLATE TRUFFLES SOLD IN ROMANIA

Ioan Mircea POP, Gabriela FRUNZA

University of Agronomic Sciences and Veterinary Medicine of Iasi

Corresponding author email: frunza.gabriela27@gmail.com

Abstract

The purpose of the study it was represented by the comparative appreciation of the quality of some assortments of chocolate truffles marketed in Romania, following the sensory, chemical (including energy value), and economic characteristics. Three types of truffles (produced in France/Belgium) were taken in the study. Sensory characteristics were analyzed by tasting, using the scoring method; the lipid content was determined by the Soxhlet method, the protein one by the Kjeldahl method, and the moisture and the dry matter by the drying method in the oven (at 105° C); the results were compared with the declared values on the label. In order to determine the economic characteristics, the purchase price for 100 g of product was taken into account. Following the sensory analysis, two products being included in the category of very good products and one was in good quality class, but with a score very close to the very good product. The major chemical content of these products was: sugar between 41-38.7% - on the label), lipids between 45-48.3% on the label vs. 44.93-47.84% determined, proteins between 4.20-4.90% on the label vs. 3.99-4.66% and salt 0.11-0.34% - on the label. The energy value of these products was 599-618 kcal per 100 g.

Key words: chocolate, truffles, lipids, proteins, energy value.

INTRODUCTION

Nowadays, the consumption of chocolates has acquired a positive contribution in human nutrition, because despite the lipid and sugar content, cocoa has high concentrations of antioxidant compounds, mainly polyphenols, including flavonoids, such asepicatechins, catechins and, particularly, procyanidins (Efraim et al., 2011; Oracz et al., 2015; Nabavi et al., 2015, Farinazzi-Machado et al., 2018). Due to the presence others compounds, scientific studies have demonstrated that the consumption of chocolates with high cocoa content is associated with the control of risk factors for cardiovascular disease, such as reduced total cholesterol and blood pressure, decreased platelet aggregation, reduced damage to the vascular endothelium and increased plasma levels of high density lipoprotein (HDL-c), in addition to reductions in inflammatory markers (Hooper et al., 2012; Zhang et al., 2013; Colombo et al., 2015; Goya et al., 2016).
After Misnawi et al. (2004) and Heath (2002), flavor is one of the most important character-ristics in chocolate products, followed by the perception of the product's texture by the mouth. The aim of the paper was represented by the comparative assessment of the quality of some assortments of chocolate truffles sold in Romania, following their sensory, chemical (including energy value), and economic characteristics.

To carry out this research, chocolate truffles wrapped in cocoa powder were studied. These truffles are made up of a filling in the form of a homogeneous mass of chocolate, over which it was carefully sprayed a layer of cocoa powder, thus creating a special aroma due to the combination of creamy-sweet interior and bitter cocoa powder.

MATERIALS AND METHODS

Three types of truffles, produced in Belgium or France ("Fancy Truffles", "Belgid` Or" and "Excelcium" - randomly coded A, B and C, five samples for each) were taken in the study. Sensory characteristics were analyzed by tasting, using the scoring method; the lipid content was determined by the Soxhlet method, the protein one by the Kjeldahl method, and the moisture and the dry matter by the drying method in the oven (at 105°C). In order to determine the economic characteristics, the purchase price for 100 g of product was taken into account.

The evaluation of the sensory quality of chocolate truffles was carried out in a sensory analysis laboratory of USAMV Iasi by the participation of a group of twenty-four students in food engineering, each receiving an individual sheet (Table 1), according to standard specifications (Table 2).

Table 1. Individual assessment sheet of the sensory quality of chocolate truffles

Characteristics	Characteristics description	Score
Appearance	Whole pieces with a regular shape and an even distribution of cocoa powder	4
	Whole pieces with regular shape and unevenness in the distribution of cocoa powder	3
	Whole pieces with partially modified shape, with uniform distribution of cocoa powder	2
	Flattened pieces, not covered with cocoa powder	1
Color	Uniform and appropriate on the entire surface of the product	4
	Uneven on a certain region of the product	3
	Uneven on the entire surface of the product	2
	Stains of different shades that are not specific to the product	1
Smell	Pronounced, aromatic, specific	4
	Poorly defined, pleasant	3
	Imperceptible or with a foreign touch	2
	Rancid, sour, inappropriate	1
Consistency	Strong, fine, creamy	4
	Strong, slightly creamy	3
	Soft, slightly creamy	2
	Soft, semi-rough	1
Taste	Sweet more than bitter, very well highlighted and specific to the product	4
	Bitter more than sweet, well highlighted and product specific	3
	Poorly pronounced, but specifically, pleasant	2
	Slightly astringent, non-specific	1
Package	Integral and appropriate packaging	4
	Satisfactory with small imperfectibly imperfections	3
	Unsatisfactory with noticeable imperfections	2
	Deteriorated, endangering the integrity of the constituent chocolate truffles	1

Table 2. Classification of the products in the appropriate quality class according to standards

Total average score	Provided qualifying
22 ÷24	Very good
18÷21.9	Good
11.6÷17.9	Satisfactorily
6÷11.5	Unsatisfactory

RESULTS AND DISCUSSIONS

After the **sensory analysis** the total score determined for two products was between 22 and 24 points (22.4 respectively 23.4), like the total average (22.51), being included in the category of very good products; one product was included in the good quality class, but with a score (21.75) very close to the very good product (Table 3).

Table 3. Total score obtained for the sensory analysis of the chocolate truffle

Products	Total score	Qualifying
A	23.40	Very good
B	21.75	Good
C	22.38	Very good
Average	22.51	Very good

The average score of sensory characteristics determined by tasting highlights differences between products, but not with very high values (Figure 1); thus, for the three analysed products they summed the following score: 10.88 for appearance, 11.13 for color, 11.01 for smell, 11.39 for consistency, 11.26 for taste and 11.88 for package, highlighting close values for all

studied characteristics. On average was obtained: 3.63 for appearance, 3.71 for color, 3.67 for smell, 3.80 for consistency, 3.75 for taste and 3.96 for package.
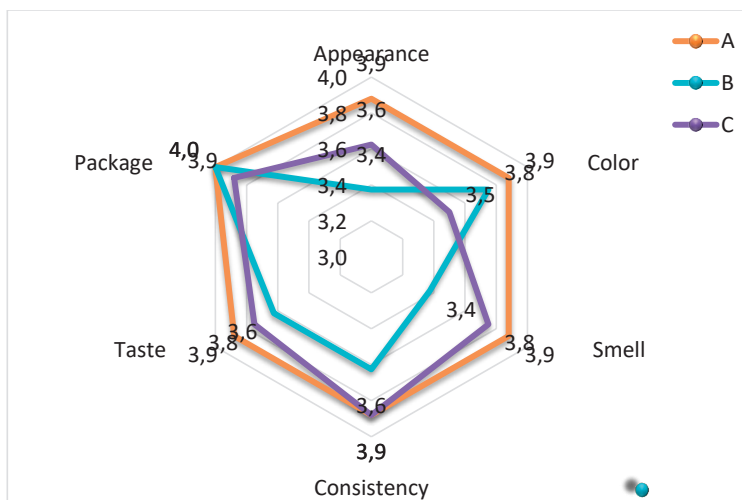

Figure 1. The average score of sensory characteristics determined by tasting

The major chemical content of these products was: total carbs 39.9% (between 41-38.7% on the label), sugar 36.77 (34-39% on the label), total lipids 46.77% / 46.59% (45-48.3% on the label vs. 44.93-47.84% determined), saturated fatty acids (SFA) 38.73 % (35-41.2% on the label), proteins 4.43% / 4.23% (4.20-4.90 on the label vs. 3.99-4.66% determined) and salt 0.23 % (between 0.11-0.34% - on the label) (Table 4 and Table 5).

Table 4. Chemical composition and energy value from the label of the chocolate truffle

Chemical composition	Product A	Product B	Product C	Average
Carbohydrates / sugars (%)	38.7/ 37.3	41/ 39	40/ 34	39.9 / 36.77
Lipids / SFA (%)	48.3/ 41.2	45/ 40	47/ 35	46.77 / 38.73
Proteins (%)	4.2	4.2	4.9	4.43
Salt (%)	0.34	0.11	0.25	0.23
Energy kcal/100g	618	599	610	609

Table 5. The chemical composition of chocolate truffles studied (values on the label and determined in laboratory)

Content / Product	% Dry Matter, D*	Sugars (%)		Lipids (%)				Proteins (%)				Salt (%)	
		L*	$\bar{x}$=100	D*	$\bar{x}$=100	L*	$\bar{x}$=100	D*	$\bar{x}$=100	L*	$\bar{x}$=100	L*	$\bar{x}$=100
A	98.92	37.3	101.4	48.30	103.3	47.84	102.7	4.20	94.8	4.03	95.3	0.34	147.8
B	99.34	39	106.1	45.00	96.2	44.93	96.4	4.20	94.8	3.99	94.3	0.11	47.8
C	98.80	34	92.5	47.00	100.5	47.00	100.9	4.90	110.6	4.66	110.2	0.25	108.7
	99.02	36.77	100	46.77	100	46.59	100	4.43	100	4.23	100	0.23	100

L - on the Label; D - Determinated in laboratory; x – Average

The energy value of analysed products was on average 609 kcal per 100 g (ranging between 599 - 618 kcal); the highest energy value (618 kcal per 100 g) was observed in the product which also contain the highest amount of lipids.

The lipid content of analysed truffles varied with -3.8...+3.3 % versus the average value and in case of protein content the variation was larger, between -5.2...+110.6 %. A large variation was identified in case of sugars content (between -

7.5...+6.1 % versus the average) and the largest variation was observed for the salt content (between - 52.2%...+8.7%
The average content of determined dry matter was 99.02 %, with a very low variation.

The average purchase price for all products studied (Table 6), was 5.37 RON per 100g, ranging between 4.6 and 6.30 RON per 100g) with a relatively large difference of 1.7 RON per 100g (37% of the minimum price).

Table 6. The price of chocolate truffles (RON) compared to their average market price

Stores	A product				B product				C product			
	Unit price	% diff.	Price/100 g	% diff.	Unit price	% diff.	Price/100 g	% diff.	Unit price	% diff.	Price/100 g	% diff.
Auchan	10.60	1.1	5.30	1.1	-	-	-	-	-	-	-	-
Carrefour	10.60	1.1	5.30	1.3	12.05	-4.3	6.03	-4.3	7.4	0.0	4.6	0.0
Cora Romania	10.74	2.4	5.37	2.9	-	-	-	-	-	-	-	-
Mega Image	10.01	-4.5	5.01	-3.6	12.75	0.1	6.38	0.1	-	-	-	-
Mega Market	8.45	-19.4	4.22	-19.3	-	-	-	-	-	-	-	-
Profi	-	-	-	-	12.99	2.0	6.50	2.0	-	-	-	-
Viostel.ro	12.50	19.2	6.25	15.9	-	-	-	-	-	-	-	-
Average	**10.50**	**-**	**5.20**	**-**	**12.60**	**-**	**6.30**	**-**	**7.40**	**-**	**4.60**	**-**

We consider that this price difference is not justified in terms of the ingredients, chemical content or nutritional value of the studied products, being mainly determined by the marketing reasons. It has also been observed that the availability of products in stores varies significantly.
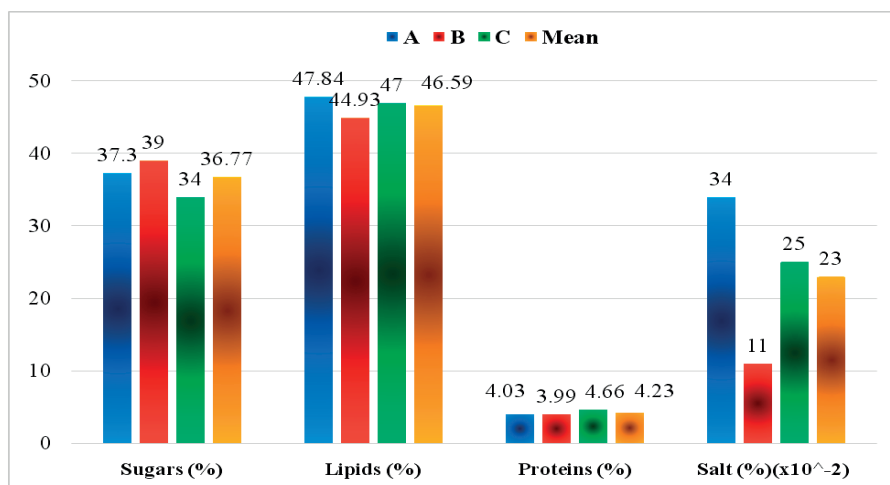

Figure 2. The chemical composition of chocolate truffles (label values)

Other characteristics. The studied chocolate truffles have an appropriate packaging from the point of view of integrity, this aspect materializing following the scores offered for the sensory assessment (on average 3.96 points). All three assortments have appropriate labeling and a resealing mechanism to preserve quality.

Two chocolate truffles (products B and C) are certified according to UTZ "Certified cocoa" (the specific marking of this organism being inscribed on the main face of the packaging) and one product (A) is certified by: BRC, IFS, iTQi and Halal.

CONCLUSIONS

The chocolate truffles studied have on average a very good score on a sensory point of view, rated for six categories of characteristics: two of them obtaining over 22 points and one product being very close to this (21.75 points). Laboratory analysis showed very small differences in the chemical composition compared to the values indicated on the product label, but larger differences could be observed between the studied products.

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