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THE STUDY ON THE CONSUMPTION AND QUALITY OF BEER ON THE CONSUMER MARKET OF THE REPUBLIC OF MOLDOVA

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Abstract: Beer is a low-alcohol drink. It is obtained by alcoholic fermentation of malt wort using brewer's yeast, and with the addition of hops. The purpose of the paper was studying the degree of compliance of the beer sold on the consumer market of the Republic of Moldova with the requirements of the Government Decision of the Republic of Moldova no. 473 and Law 279 on consumer information on food products. The research object was 7 types of beer (local and imported) purchased in different commercial networks and supermarkets of Chisinau. The analysis of the data obtained as a result of scientific research shows that out of 7 studied products, 4 correspond to the organoleptic and physic-chemical requirements according to HG 473 (Bohemian beer, Zlata Praha beer, Velkopopovicky Kozel beer, Velkopopovicky Kozel Cerny beer). The other 3 products showed deviations in foam height. At the same time, we note that the labels of all 7 products fully comply with the requirements of Law 279 (on informing the consumer about food products) and contain all the mandatory references.

Keywords: beer, quality, organoleptic analysis, physical and chemical analysis, information on the label

JEL Classification: L15

Introduction

Beer is one of the oldest and most popular drinks, with a relatively low degree of alcoholization and which, due to its pleasant taste and refreshing effect, is considered the national drink of many nations. The etymology of the word beer originates from the Latin "bibere" and has the meaning of drinking. Beer is a fermented beverage made primarily from four ingredients; water, barley malt, hops and yeast. Each of these ingredients imparts its own taste and aroma characteristics to the finished product [6].

Like other types of alcohol, beer can give you a pleasant feeling. Low alcohol content is good because it reduces the risk of negative effects on our body. Even more interesting, the Indiana Alcohol Research Center found that certain flavor components of beer can trigger the production of dopamine, making you feel good.

Beer is a drink with a lower alcohol content compared to wine. It is obtained by alcoholic fermentation of malt wort using brewer's yeast, and with the addition of hops. It is allowed to partially replace the malt for brewing beer with unmalted grains, taking into account that the total mass of the substituted malt does not exceed 30%.

The content of ethyl alcohol in most types of beer is 2.8-7.9% vol., the content of beer wort extract is 8-20%, carbon dioxide - min 0.35%.

Beer provides between 300÷780 kcal/l, depending on its alcohol content. Due to its high content in water (91%÷92%) and its content in mineral elements, beer satisfies the feeling of thirst and covers the losses in trace elements that occur through sweat.

Currently, in Europe, the largest producer of beer is Germany, followed by Great Britain, Belgium, the Czech Republic, etc. According to the information available to the public, in the last 10 years it is considered that the "daily norm" of consumption of alcoholic beverages is: 30 grams of strong alcoholic beverages (vodka/cognac/brandy); 150 milliliters of wine and 250 milliliters of beer [5].

The information presented on the Beer consumption map, figure 1, shows that the Republic of Moldova does not refer to countries with a high consumption of beer and in 2022 this quantity was 0-40 liters per capita/year.

The biggest beer consumer in Europe is the Czech Republic with 135 liters of beer. In this figure we can see a very interesting geographical pattern. Central Europe is clearly the biggest consumer of beer. The Czech Republic, Austria, Poland and Germany are not only the biggest beer consumers in Europe, but also in the whole world. Romania is the largest consumer of beer outside of Central Europe and is number 5 in Europe, figure 1, [3].

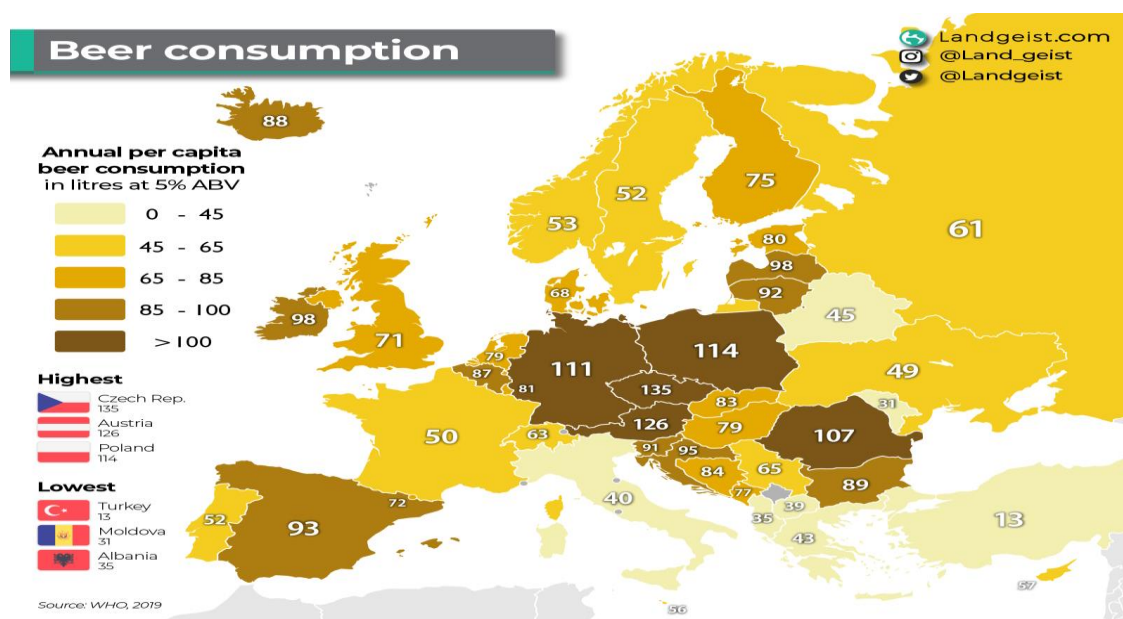


Figure 1. Beer consumption in Europe (in liters, alcohol concentration 5% Vol), capita/inhabitant/year

Source: <https://landgeist.com/2022/03/18/beer-consumption-in-europe/> [3].

Depending on the specifics of the production process, the food industry produces the following diversifications of beer [2]:

- beer with an alcohol content: 2.8-7.9% vol.;
- non-alcoholic beer – beer with a volume fraction of alcohol of max. 0.5% vol.;
- wheat beer – beer with a wheat malt content of min. 50% of the total amount of malt used in the composition of the raw material;
- filtered beer - beer obtained by the method of artificial separation of particles and yeasts from the drink;
- unfiltered beer – beer that has not passed the stage of separating particles and yeasts from the drink;
- pasteurized beer – beer subjected to heat treatment (pasteurization);
- unpasteurized beer – beer that is not subjected to heat treatment (pasteurization);
- blond beer – beer with a color of up to 2.5 color units or up to 31 EBC units (European Brewing Convention);
- brown beer – beer with a color of 3.0 color units or more than 36.0 EBC units.

The quality of beer in the Republic of Moldova must meet the requirements: Government Decision No. 473 for the approval of the Technical Regulation "Beer and beer-based beverages" [2]. This document establishes the terminology, the minimum quality conditions, the requirements regarding the production process, labeling, the rules and procedures for assessing conformity, as well as for supervising the manufacture and placing on the market of domestically produced and imported beer.

So, according to Government Decision No. 473, *beer* is a foamy alcoholic drink, saturated with carbon dioxide, obtained by fermentation of beer wort prepared from malt for the manufacture of beer, hops and/or hop products, water and brewer's yeast without the addition of ethyl alcohol, flavorings and taste additives.

It is allowed to partially replace the malt for brewing beer with unmalted grains, provided that the total mass of the substituted malt does not exceed 30%.

The addition of sugar or sugar syrups is allowed provided that their mass does not exceed 3% of the mass of the substituted malt.

The beer intended for placing on the market must correspond to the organoleptic and physico-chemical characteristics for each type of beer, established in the related standards and company standards for each specific name, and the characteristics indicated in annexes in Government Decision No. 473 for the approval of the Technical Regulation "Beer and beer-based beverages"

When labeling beer, the requirements of Law no. 279 *Regarding consumer information on food products* must be followed.

The information for the consumer must be presented through text and/or marking on the product's packaging and/or labels and indicated in the state language. When selling the import product on the domestic market, it is allowed to present the information in other languages, placing its translation in the state language next to it. For production intended for export, the information is presented according to the contract.

The beer packaging must contain the following information [1]:

- the country of origin (for beer manufactured in the Republic of Moldova, the mention Made in Moldova is indicated);
- the name and address of the manufacturer and/or importer, distributor;
- the name of the product;
- the name with which the beer is placed on the market;
- type of beer;
- the inscription "pasteurized" for pasteurized beer;
- list of ingredients;
- the extract content of beer wort, % (except for non-alcoholic beer, special beer and beer-based drinks);
- the minimum volume fraction of alcohol, % vol.; for non-alcoholic beer - the maximum volume fraction of alcohol, % vol.;
- the volume, l;
- nutritional value (in g) and energy value (in kcal) per 100 g of beer;
- date of manufacture;
- the validity period or consumption limit date;
- storage conditions;
- other information that does not contravene the legislation in force.

The purpose of the work is studying the degree of compliance of the beer sold on the consumer market of the Republic of Moldova with the requirements of the Government Decision of the Republic of Moldova no. 473 and Law 279 on consumer information on food products.

The research object was 7 types of beer (local and imported) purchased in different retail chains and supermarkets from Chisinau:

- sample 1. Blond beer Carlsberg, pasteurized, alc. 5.0% vol, 0.45l, Î.C.S Carlsberg SRL RM
- sample 2. Blond beer Chisinau, pasteurized, alc. 4.5% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery
- sample 3. Blond Beer Bohemian, unpasteurized, alc. 4.5% vol, 1.5l, Rivex SRL
- sample 4. Blond beer Zlata Praha, pasteurized, alc. 5% vol, 0.5l, SRL Oboloni, RM
- sample 5. Blond Beer Velkopopovicky Kozel, alc. 4.0% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery
- sample 6. Special brown beer Velkopopovicky Kozel Cerny, alc. 3.7% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery
- sample 7. Brown wheat beer Franziskaner WeissBier Dunkel, alc. 5% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Research methodology of quality of beer

The determination of quality of beer was carried out according to the methods of scientific knowledge recognized in commodity science: organoleptic and physic-chemical analysis. Standardized indicators of quality of beer were studied according to the documents in force - Government Decision No. 473 for the approval of the Technical Regulation "Beer and beer-based beverages" [2].

Thus, we analyzed the following characteristics: organoleptic indicators - appearance, taste, aroma, physic-chemical indicators: foam characteristic (height and persistence); acidity; pH and color index.

Analysis of the information on the labels - according to the requirements of Law 279 on consumer information on food products.

Research results

Checking the information on the labels shows that all the mandatory information (according to Law 279 on consumer information on food products) is present on the product labels.

The results of organoleptic and physic-chemical determinations are presented in tables 1 and 2.

Table 1. The results of organoleptic research

Indicators	Characteristics according to the HG 473		Real characteristics						
	Blond beer	Brown beer	sample, no*						
			1	2	3	4	5	6	7
Appearance	Clear, foamy liquid, without sediment and foreign inclusions.		+	+	+	+	+	+	+
Taste	Taste of malt and hops, with bitterness corresponding to the type of beer.	Full malt taste and pronounced nuance malt of caramel, with pleasant bitterness, corresponding to the type of beer	+	+	+	+	+	+	+
Aroma	Aroma corresponding to the type of beer, pure and without foreign odors.		+	+	+	+	+	+	+

*Sample 1. Blond beer Carlsberg, pasteurized, alc. 5.0%vol, 0.45l, Î.C.S Carlsberg SRL RM

Sample 2. Blond beer Chisinau, pasteurized, alc. 4.5%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Sample 3. Blond Beer Bohemian, unpasteurized, alc. 4.5%vol, 1.5l, Rivex SRL

Sample 4. Blond beer Zlata Praha, pasteurized, alc. 5%vol, 0.5l, SRL Oboloni, RM

Sample 5. Blond Beer Velkopopovicky Kozel, alc. 4.0%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Sample 6. Special brown beer Velkopopovicky Kozel Cerny, alc. 3.7%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Sample 7. Brown wheat beer Franziskaner WeissBier Dunkel, alc. 5%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

The results of organoleptic research show that all samples of beer comply with the requirements of Annex No. 1. of Government Decision 473. None of the beer samples deviates from the norms in appearance, taste or aroma.

Table 2. Results of physic-chemical research

characteristics	According to GD 473		Real characteristics						
	Blond beer	Brown beer	sample, no. *						
1 blond			2 blond	3 blond	4 blond	5 blond	6 brown	7 brown	
foam height, mm, min	30	30	27	23	37	34	33	37	23
foam persistence, minutes, min	20	20	28	30	30	27	32	30	30
color index, un.c.	0,2-2,5	>2,5	1,3	1,4	1,4	2,5	2,5	3,5	2,8
pH	3,8-4,8	3,8-4,8	4,1	4,3	3,8	3,8	4,5	4,5	4,1
Acidity, un.a., max.	2,5-5,0	2,8-5,5	2,8	2,5	2,9	2,5	2,5	2,8	2,9

*Sample 1. Blond beer Carlsberg, pasteurized, alc. 5.0%vol, 0.45l, Î.C.S Carlsberg SRL RM

Sample 2. Blond beer Chisinau, pasteurized, alc. 4.5%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Sample 3. Blond Beer Bohemian, unpasteurized, alc. 4.5%vol, 1.5l, Rivex SRL

Sample 4. Blond beer Zlata Praha, pasteurized, alc. 5%vol, 0.5l, SRL Oboloni, RM

Sample 5. Blond Beer Velkopopovický Kozel, alc. 4.0%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Sample 6. Special brown beer Velkopopovický Kozel Cerny, alc. 3.7%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Sample 7. Brown wheat beer Franziskaner WeissBier Dunkel, alc. 5%vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery

Analyzing the obtained results, we find that Sample 1, sample 2 and sample 7 (Carlsberg blonde pasteurized beer, Chisinau Blond pasteurized beer, Franziskaner Weiss Bier Dunkel brown wheat beer) do not meet the requirements of Government Decision 473 according to the *foam height indicator*. The other varieties of beer comply with this indicator.

At the same time, we note that in all 7 types of beer no deviations were recorded in terms of foam stability, acidity, pH and color.

Besides that, research on the sensory evaluation of beer was carried out. The scoring method (25 points) was applied [4] in order to analyze the following characteristics: transparency, color, taste, aroma and foam characteristic by measuring its height and persistence.

The conditions of sensory analysis are presented in Table 3.

Table 3. Sensory analysis of beer (25 points)

indicators	Number of points			
	excellent	good	satisfactory	unsatisfactory
Transparency	3	2	1	0
Color	3	2	1	0
Taste	5	4	3	2
Hop bitterness	5	4	3	2
Aroma	4	3	2	1
Foam characteristic	5	4	3	2
-foam height, mm, no less	40	30	2	<20
-foam persistence, mm, no less	4	3	2	<2
Total, points	22-25	19-21	13-18	<12

Source: <https://znaytovar.ru/new65.html>

The obtained results showed that the beer assortments taken for the sensory analysis obtained between 15 and 25 points.

The *excellent rating* was obtained by: sample 5 (Blond beer Velkopopovicky Kozel, alc. 4.0% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery) and sample 6 (Special brown beer Velkopopovicky Kozel Cerny, alc. 3.7 % vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery).

The *good rating* was characteristic for the following 3 types of beer: sample 1 (Carlsberg - blond pasteurized beer, alc. 5.0% vol, 0.45l, Î.C.S Carlsberg SRL RM), sample 3 (Bohemian - blond unpasteurized beer, alc. 4.5% vol, 1.5l, Rivex SRL) and sample 4 (Zlata Praha - blond pasteurized beer, alc. 5% vol, 0.5l, SRL Oboloni, RM).

The *satisfactory qualification* was given to samples no. 2 (Blond pasteurized beer – Chisinau, alc. 4.5% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery) and no.7 (Brown wheat beer - Franziskaner WeissBier Dunkel, alc. 5% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery). These two samples scored less due to poor foam.

Conclusions

Commodity research was carried out regarding the compliance of beer with the current requirements of Government Decision 473 and Law 279.

The analysis of the data obtained as a result of scientific research demonstrates that out of 7 studied products, 4 types of beer (blonde Bohemian beer, Zlata Praha, blonde Velkopopovicky Kozel beer, special brown Velkopopovicky Kozel Cerny beer) meet the organoleptic and physic-chemical requirements according to Government Decision 473. The other 3 products showed deviations in foam height.

All 7 products correspond to the requirements of Law 279 and contain all the mandatory mentions.

In the sensory analysis, sample 5 (blonde beer Velkopopovicky Kozel, alc. 4.0% vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery) and sample 6 (special brown beer Velkopopovicky Kozel, alc. 3.7 % vol, 0.5l, Î.M. Efes Vitanta Moldova Brewery) obtained a maximum number of points (25).

References:

Law 279 on informing the consumer about food products.

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