

Mayonnaise quality expertise

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Abstract

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Introduction. The indisputable factor of success of a trademark is the quality of the product manufactured. The quality of mayonnaise is determined by the complex of indicators such as organoleptic (taste, smell, colour, consistence), physicochemical (fattiness, starch, acidity, the presence of acids), microbiological (bifid bacteria, microorganisms, yeast, fungi, bacteria).

Materials and methods. The research was carried out on the example of samples of Ukrainian manufacturers of various trademarks. The mayonnaise samples were analyzed according to organoleptic, physical and chemical, microbiological indicators. The packaging and labelling of the product were assessed as well.

To detect the level of the quality of mayonnaise the 5-point descriptor-profile method of sensory analysis was used and a group of experts was involved.

Results and discussion. The results of the labelling analysis have proved no indication of index E in food additives descriptions of the following trademarks: “Korolivsky Smak” Korolivsky and “Olis” Provansal.

The descriptors of organoleptic indicators (consistence, taste, smell and colour), packaging labelling and design have been suggested, their 5-grade scale of profiling determined. Descriptor-profile method helps to distinguish the most competitive and attractive for the consumer product. “Korolivsky Smak” Korolivsky and “Torchyn” Provanskiy have got the highest evaluation mark.

Physicochemical studies of mayonnaise show that all the samples contain 0,18% to 0,51% of acidity, 67% of fat which is indicated in the packaging information. The amount of sorbic acid is within the norms – not more than 1000mg/kg. Apart from this, “Olis” uses benzoic acid as a preservative which is not indicated in the description and its content is 19,4 mg/kg.

Micro-biological research has detected no violation by any manufacturer.

Conclusions. The results of research mayonnaise on physico-chemical and microbiological indicators of prove that their values fully compliant comply with the requirements of current regulations.

Introduction

Mayonnaise occupies a leading place among various fat-based sauces and dressing. They are easily digested and are recommended for daily use by all population groups, including prophylactic and dietary food, for making different dishes, sandwiches, salads both in home cooking and in public catering.

Therefore, the relevance of monitoring the varieties of mayonnaise and its quality analysis is beyond any doubt.

The aim of the research is to carry out the quality analysis of the mayonnaise and the comparative analysis of labeling of different manufacturers, organoleptic, physical, chemical and microbiological indicators. To achieve the aim the following tasks are to be carried out: to consider the mayonnaise quality requirements, to conduct a comparative expertise of the quality of mayonnaise of different manufacturers.

Mayonnaise products enjoy a high popularity among the population of Ukraine and occupies an important place in the nutrition structure.

Mayonnaise is a finely dispersed creamy "oil in water" type emulsion, made of refined, deodorized vegetable oils with the addition of emulsifiers, stabilizers, thickeners, flavorings and spices [1].

The traditional mayonnaise recipe includes refined and deodorized vegetable oil, (72%), egg yolks (9.2%), mustard (2.4%), sugar (2%), food acid (14.4%) [2]. But this type of mayonnaise contains an increased cholesterol content, biological value being low. It has low stability to delamination and a high energy value. It contains food acid, which makes it impossible to use by a wide range of consumers. [3].

The analysis of production and perspective needs of mayonnaise products has revealed the need of quality improvement and diversification by using food additives that will provide the necessary nutritional value of the product [4].

Food additives in the recipe of mayonnaise not only improve the nutritional and biological value, but also stabilize the emulsion, and help avoid traditional structure-creators, which have undesirable side effects. [5] In some cases an emulsifier is introduced to create a stable emulsion of high-calorie mayonnaise. In case of low-fat recipes stabilizers are used to provide stability and prevent separation. They improve viscosity of the disperse environment, prevent oil drop fusion, being hydrophilic by nature [6].

Calorie reducing is very important when developing health-improving products. Since nowadays fats provide 30-35 % of one's dietary energy, fat reduction is one of the requirements for producing dietary and health-improving emulsion products. In health-improving mayonnaise the proportion of polyunsaturated fatty acids ω -6 and ω -3 should be (5-10):1 [7].

Food acids added to mayonnaise serve as both flavorings and preservatives. Reducing calorie emulsions pH from 6.9 to 4.0-4.7, they prevent the production of undesirable microorganisms [8]. Speaking about the functionality of the product, it should be noted that acetic acid or citric acid used in the recipe of mayonnaise, has a significant irritating effect on the mucous membranes of the gastrointestinal tract.

In recent years, the people's attitude to the diet and its importance has changed dramatically. Consumers are increasingly interested in the influence of various foods and their components on health.

Materials and methods

The research was carried out on the example of samples of Ukrainian manufacturers of various trademarks. Materials for the mayonnaise quality expertise are samples of the following trademarks: “Korolivsky Smak” Korolivsky (“Victor and C”), “Olis” Provansal (“Olis Ltd company”), “Torchyn” Provanskiy (Volynholding), “Olkom” Kids Style (Kyiv margarine plant).

The organoleptic characteristics of mayonnaise are assessed by its consistency, appearance, colour, smell and taste in accordance with the requirements, shown in Table 1.

Table 1
Characterization of mayonnaise organoleptic properties

Indicator	Product characteristics
Outward appearance and consistence	Homogeneous, similarly creamy or dense creamy product with single air bubbles
Taste and smell	Inherent mayonnaise specific name, slightly spicy, sour, with taste of smell, and aromatic additives
Color	From white to cremate yellow or due to imposed color additives. Homogeneous whole mass

Physico-chemical characteristics of mayonnaise emulsion are measured by various indicators [8, 9], including such rheological characteristics:

- dynamic structural viscosity (depends on different voltage of shear, is determined by the construction of the rheological curves);
- sedimentation stability (in volume separated phases by centrifugation at 5000 rev / min for 5 min,%);
- acidity;
- mass fraction of fat, moisture, salt.

For microbiological parameters mayonnaise must correspond to the requirements specified in Table 2.

Table 2
Characterization of mayonnaise microbiological properties

Indicator	Norms
Number of bifidobacteria, CFU/g, not less	1×10^6
Bacteria of Escherichia coli (E. coli), in 0,01 g	It is forbidden
Pathogenic microorganisms including Bacteria of the genus Salmonella, in 25 g	missing
Yeast, CFU in 1 cm ³ , not more than	1×10^3
Molds, CFU in 1 cm ³ , not more than	1×10

For mayonnaise expertise a group of competent experts was formed. Physico-chemical and microbiological tests was carried out in accordance with [9-11].

Results and discussion

The first stage includes analysis of product labeling of different manufacturers, that have the index, warning, recommending and descriptive tools. Labeling description comparing the norms and actually available on the label information of the samples are presented in Table 3.

Table 3

Labelling results of the samples

Marking requirements	Manufacturers			
	“Korolivsky Smak”	“Olis”	“Torchyn”	“Olkom”
Labelling performed in the official language.	+	+	+	+
Each mayonnaise type is produced with a specific name according to the recipe.	+	+	+	+
In consumer packaging there is special marking to ensure a clear reading, which contains:	+	+	+	+
- the full mayonnaise name;	high-calorie mayonnaise "Korolevsky y" 67%	high-calorie mayonnaise "Provencal" 67%	high-calorie mayonnaise "Provanskiy " 67%	high-calorie mayonnaise "Kids style" children's style 67%
- the name, full address and the phone of manufacturer for production capacity;	+	+	+	+
- net weight (g);	360	370	190	200
- nutritional value; protein / fat / carbs, g in 100g	619 0,1/ 67/ 3,12	625 0,47/ 67/ 4,75	619 0,4/ 67/ 3,6	617 0,8/67/ 2,4
- expiry date / conditions of storage;	120 days at 0–18°C, after opening of 14 days at 0–11°C	180 days at 0–10°C, 120 days at 10–18°C, after opening of 14 days at 0–11°C	120 days at 0–18°C, after opening of 14 days at 0–11°C	60 days at 0–5°C, 45 days at 5–10°C, 30 days at 10–18°C, after opening of 7 days at 0–11°C
- standard designations;	+	+	+	+
- the lot number of production;	+	+	+	+
- EAN bar-code	+	+	+	+

Besides, in consumer packages have special marks to ensure accurate readings, which includes mayonnaise composition with the indication of the international symbol "E": in "Korolivsky Smak" – sunflower oil, water, sugar, starch, emulsifier, salt, citric acid, egg powder, acetic acid, stabilizer guar gum, potassium sorbate preservative, synthetic mustard flavor, natural flavor of black pepper, natural beta-carotene colorant; in "Olis" – sunflower oil, water, sugar, egg yolk powder, starch-thickener and starch-emulsifier, salt, synthetic acetic acid, stabilizer xanthan gum, potassium sorbate preservative, flavoring "Mustard", citric acid, a natural colorant, beta-carotene; in "Torchyn" – sunflower oil 66.7%, water, sugar, alcohol vinegar 2%, salt 1%, dried egg yolk 1%, lactic acid, white mustard seed and sarepts koy 0.3%, xanthan gum stabilizer, potassium sorbate preservative, antioxidant E385, colorant E160a; in "Olkom" – sunflower oil, water, sugar, egg yolk, egg powder, salt, apple vinegar, lactic acid E270.

All the labeling analysis results considered the following conclusions have been made: the labels of such brands as "Torchin" Provanskiy (Volynholdinh); «Olkom» Kids style (Kyiv margarine plant) contain the information that meets all the requirements of regulations. The samples of "Korolivsky Smak" Korolivsky ("Victor and C") and "Olis" Provansal ("Olis Ltd company") have revealed no index E indication as food additives.

Studies of organoleptic mayonnaise characteristics were the next stage of expertise. Slight differences in taste and smell have been noted, mainly because of a more or less distinct sour taste. Overall, during the mayonnaise tasting four parameters were evaluated: colour, consistency, smell and taste (Table 4).

Table 4

Requirements organoleptic indicators

Indicator/ brend	1	2	3	4
Color	light-yellow colour	white with a creamy yellowish shade	white with cream shade	white color
Consistency	creamy, dense, homogeneous	creamy, dense, homogeneous	creamy, dense, homogeneous	creamy, dense, homogeneous
Smell	distinctive, slightly acidulous	characteristic, insufficiently pronounced	rather acidic	characteristic, insufficiently pronounced
Taste	characteristic	characteristic	rather acidic	characteristic

The next stage was the study of physicochemical and microbiological parameters such as fat, acidity, the presence of starch and preservatives because these ingredients are declared as part of the mayonnaise of some manufacturers (Table 5).

Norms for indicating fat and acidity are not regulated in Ukraine. The acidity of the samples tested was between 0.18% and 0.51%. The fat content indicated on all the samples (67%) corresponds to the actual one.

Table 5

Results of physical and chemical research

Physical and chemical indicators	normal	not conform	normal	normal
fat, declared / in fact, %	67/ 69,6	67/ 66	67/ 67	67/ 67
starch	declared / found	declared / found	not declared / not found	not declared / not found
acidity, degrees	0,51	0,3	0,18	0,24
sorbic acid, not more than 1000 mg / kg	declared / 496,3	declared / 344,4	declared / 555,8	not declared /
benzoic acid, mg / kg	not declared / not found	not declared / 19,4	not declared / not found	not declared / not found
Microbiological indicators	normal	normal	normal	normal
E. coli is not allowed in 0.01 g	not found	not found	not found	not found

No starch has been found in such samples as "Torchin" and "Olkom Kids style", which is indicated on the package. "Torchin" marked another thickener – xanthan gum – in the composition of mayonnaise, no thickeners are declared in the mayonnaise composition of the other brands.

Lactic acid (E270) has been detected in «Olkom», which works as both a regulator of acidity and a preservative. The amount of sorbic acid (potassium sorbate) of the other samples is within the rules – no more than 1000 mg / kg.

The mayonnaise "OLIS" proved to contain an undeclared preservative – benzoic acid (19,4mg / kg.). Probably, the preservative came from the raw materials, but obviously not from the sunflower oil.

All microbiological parameters of the samples were within normal limits. E. coli have not been found in any of the samples.

Using a scientific approach to determining the quality of the mayonnaise samples, we conducted an independent experimental investigation, using descriptive-profile method of sensory analysis based on a 5-grade system and involving a group of experts. This has allowed to determine the level of product quality, to make graphic processing of the results, to determine the competitiveness of certain samples and to make objective conclusions.

We have suggested a list of product quality indicators, introduced a 5-grade scale and profiling of these indicators according to the scale has been done by the competent expert group of 4 people. Group assessment can be considered sufficiently reliable only in case of if a good consistency of responses of individual experts. In this case, the discrepancies between the experts in their assessments are inevitable, but the magnitude of the diversion is important. To assess the opinion diversion of the experts a dispersion coefficient of concordance has been applied. (W) [7]. The data got from calculating the coefficient of concordance showed that $W = 0,71$ which demonstrates the concordance of experts.

Descriptor – profile method involves using a 5-grade system of assessing the quality by organoleptic indicators (descriptors) and profiling of quality indicators. High

product quality alone will not be able to ensure a full success of the product on the market. Esthetic characteristics also have to be considered. To determine the overall quality score of mayonnaise, we have selected the following descriptors: labeling, packaging design, organoleptic properties (consistence, taste, smell and colour). The results of descriptor grading are presented in Table 6.

Profiling mayonnaise descriptors by a 5-grade scale

Table 6

Scoring	Characteristics of quality indicators (descriptors)
Labelling	
5	Meets the requirements of regulatory documents
4	Meets the requirements, illegibility in labeling detected
3	Labelling somewhat unclear, some information missing (the phone of the manufacturer, etc)
2	Incomplete Labelling, packaging has external defects.
1	Labelling does not correspond to the type of product.
Packaging design	
5	Information must meet the criteria of the regulations. The picture should be bright with harmonious colours.
4	Picture not bright enough
3	Packaging and labeling colours are the same
2	Untidy, unaesthetic image, illegible inscription
1	Absence of any artistic image. No reliable, sufficient, available information
Consistency	
5	Homogeneous, creamy thick product with single air bubbles
4	Homogeneous but insufficiently creamy product
3	Not homogeneous enough, slightly liquid
2	Inhomogeneous, liquid product
1	Stratified, lumpy
Taste and smell	
5	Pleasant, characteristic for mayonnaise
4	Characteristic but less pronounced
3	A bit rich
2	Unpleasant, not inherent to this type of product
1	Rancid taste
Color	
5	Light cream, homogeneous by the whole weight
4	More intense, homogeneous for the whole mass
3	White, no shades of cream colour
2	Heterogeneity of colour
1	Yellow colour

Averaged expert opinions on each of the proposed indicators and generalized index of quality ratios are shown in Table 7.

Table 7
Assessment and quality level of mayonnaise of different trademarks

Trademark	Consistency	Taste and smell	Color	Labeling	Package appearance	Generalized indicator of quality	Level of quality
“Korolivsky Smak” Korolivsky	4,85	4,65	4,75	4,53	4,82	4,72	0,944
“Olis” Provansal	4,83	4,21	4,83	4,51	4,89	4,654	0,93
“Torchyn” Provanskiy	4,89	4,16	4,72	4,88	4,77	4,684	0,936
“Olkom” Kids Style	4,81	4,24	4,56	4,92	4,73	4,652	0,93

The results conducted research revealed that the highest of quality products has “Korolivsky Smak” Korolivsky and “Torchyn” Provanskiy.

For a visual perception of research results and identify competitive products are performed elaboration of graphic – build profilohramu (Figure 1):

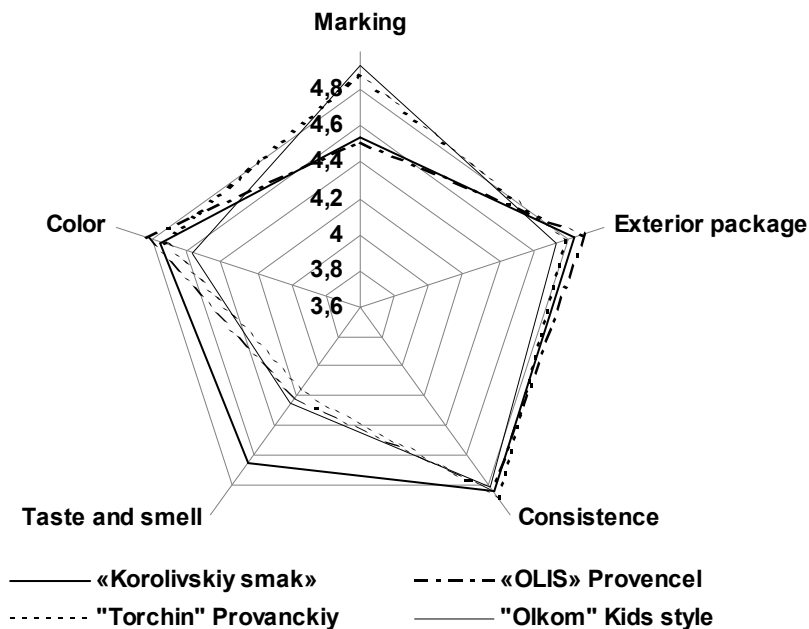


Figure 1. Profilohrama quality of mayonnaise

The results of research mayonnaise on physico-chemical and microbiological indicators of prove that their values fully compliant comply with the requirements of current regulations.

On the whole, high results of the study of the mayonnaise quality of different manufacturers prove that raw materials of high quality and the latest technologies are used.

Conclusions

5-grade scale descriptor profiling for the quality assessment of mayonnaise of different manufacturers based on organoleptic characteristics and packaging labeling has been suggested. Physicochemical and micro-biological studies of mayonnaise samples have been carried out and prove that all the quality characteristics meet the standard. The obtained results of the mayonnaise quality studies helped to identify and clearly present competitive products.

After some investigation of quality indicators the mayonnaise samples, we can conclude that the highest score receives the sample №1 and 2 "Royal taste" and TM "Torchin" because they meet all the requirements of regulatory documents. These high results prove that during its production was used quality raw materials and latest technology.

In order to compete in the domestic and international markets enterprises Ukraine must use only high-quality raw materials that meet regulatory requirements and improve manufacturing process and control of mayonnaise quality.

However, we must remember that despite the high quality of mayonnaise can not be taken without control, you must use a product is made of natural ingredients, and use it in limited quantities.

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