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## CONDUCTING COMMODITY ASSESSMENT OF LACTOSE FREE AND ORDINARY (LACTOSE) YOGHURTS ON THE EXAMPLE OF UKRAINIAN PRODUCERS

The objects of research were 5 lactose-free and 5 ordinary (lactose) yoghurts presented on the market in Kharkiv (Ukraine). When carrying out research work, a complex of generally accepted chemical, physicochemical, mathematical methods was used, corrected for the merchandising evaluation of yoghurts.

The first stage of the study was to conduct a comparative organoleptic assessment of selected samples, paying attention to the uniformity of consistency, the presence of inclusions, the presence of foreign odors and flavors, as well as the uniformity of color.

According to the results of a comparative organoleptic quality assessment, it was found that all the studied samples of yoghurts had the same pure, sour milk taste, without extraneous odors unusual for the product, with a well-expressed sour taste. The results of the consistency assessment indicate that on the surface of sample No. 3 there was a separation of whey and a curd, with an undisturbed clot, which occurred due to the fact that lactose-free yoghurt was produced by the thermostatic method.

The second stage of the comparative merchandising assessment of selected yoghurt samples was to determine their main physical and chemical parameters in accordance with the requirements of DSTU 4343:2004 «Yoghurts. General technical requirements».

The analysis of the physicochemical indicators of the studied samples showed that only sample 1 had deviations from the requirements of the normative and technical documentation, namely, the content of the mass fraction of dry substances was lower by 0.3 %, which indicates non-compliance with the product manufacturing technology. The content of the mass fraction of dry substances of other samples was within acceptable limits.

When determining the content of titratable and active acidity, the mass fraction of fat in yoghurts, it was found that all the samples under study did not deviate from the requirements of the regulatory and technical documentation.

It was found that carrying out a commodity assessment (determination of organoleptic and physicochemical indicators) makes it possible to obtain a set of results on the freshness of the studied samples of lactose-free and ordinary (lactose) yoghurts.

**Keywords:** commodity assessment, lactose-free yoghurt, ordinary yoghurt, organoleptic and physico-chemical quality indicators.

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### 1. Introduction

Milk and dairy products are necessary to maintain human life, they are an important source of protein, vitamins and minerals, as well as calcium, are essential for public health [1]. One of the popular fermented milk products widely used in the diet of people in many countries of the world is yogurt [2]. Yoghurts have high medicinal, nutritional and dietary properties [3]. They are used for the treatment and prevention of inflammatory processes, diseases of the lungs and gastrointestinal tract [4]. Regular consumption of yoghurts increases the body's resistance to the development of pathogenic bacteria, infections, and oncological diseases, and also helps to increase immunity, reduce the body's intoxication [5]. Recently, the range of yoghurts has significantly expanded not only in terms

of the mass fraction of fat, types of fillers, consistency, packaging, shelf life, but also in terms of lactose content: lactose-free, low-lactose and with a standard lactose content [6, 7]. The most promising types of yoghurts are considered lactose-free and low-lactose, because lactose intolerance is very widespread in the world. It is estimated that 70–75 % of the world's population suffers from lactase deficiency [8, 9]. The spread of this pathology, for example, in Ukraine is, depending on the region, 15–35 % of the adult population. For this category of people, it is necessary to develop special dairy products – lactose-free and low-lactose. A promising direction for the development of the dairy industry is the targeted production of exclusive varieties of yoghurts intended for people with lactose intolerance [10–12]. Today, assessing the quality of yoghurts is relevant, because sometimes, to reduce their

cost, manufacturers can use low-quality raw materials, which are impossible, because yoghurts are consumed by sick people and children, and therefore they should in no way harm health.

Taking into account the urgency of this problem, the aim of research is to conduct a commodity assessment of lactose-free and conventional (lactose) yoghurts of various manufacturers using the example of Ukrainian manufacturers. The objects of the study were 5 lactose-free and 5 ordinary (lactose) yoghurts presented on the market in Kharkiv (Ukraine):

- sample No. 1 – «Latter for health». Lactose-free yoghurt. Manufacturer: Branch of «Sumy Dairy Plant» SE «Aromat»;
- sample No. 2 – «Latterforhealth» Yogurt «Greek style». Manufacturer: JSC «Chernhiv Milk Plant»;
- sample No. 3 – «Molokia» White lactose-free thick yogurt. Manufacturer: CJSC «Ternopil Dairy Plant»;
- sample No. 4 – «Na zdorovia». Lactose-free drinking yoghurt. Manufacturer: «Lustdorf»;
- sample No. 5 – lactose-free yoghurt, TM «Yahotynske». Manufacturer: JSC Yahoty Butter Plant;
- sample No. 6 – «Traditional» yogurt, TM «Zarechye». Manufacturer: PJSC «Kupyansk Milk Canning Plant»;
- sample No. 7 – sugar-free yoghurt, TM «Na zdorovia». Manufacturer: Lustdorf firm;
- sample No. 8 – «Classic» yogurt, TM «Yahotynske». Manufacturer: JSC Yahoty Butter Plant;
- sample No. 9 – white drinking yogurt TM «Molokia». Manufacturer: CJSC «Ternopil Dairy Plant»;
- sample No. 10 – «Carpathian» yogurt without sugar, TM «Galychyna». Manufacturer: Galychyna Dairy Company LLC.

## 2. Methods of research

When performing research work, a set of generally accepted chemical, physicochemical, and mathematical methods was used, corrected for the assessment of lactose-free and conventional (lactose) yoghurts. Sampling was carried out in accordance with GOST 26809-86 «Milk and dairy products. Acceptance rules, sampling methods and sample preparation for analysis». The organoleptic characteristics of selected research samples were determined in accordance with DSTU 4343:2004 «Yoghurts. General technical conditions». The mass fraction of fat was determined in accordance with GOST 5867-90 «Milk and dairy products. Methods for the determination of fat». The mass fraction of dry fat-free substances was determined in accordance with GOST 3626-73 «Milk and dairy products. Methods for determination of moisture and dry matter». The titratable acidity was determined in accordance with GOST 3624-92 «Milk and dairy products. Titrimetric methods for determining acidity», active acidity – GOST 26781-85 «Milk. Methods for measuring pH». Mathematical and statistical processing of the experimental results was carried out using a personal computer in MS Excel 2003.

## 3. Research results and discussion

The first stage of research was a comparative sensory evaluation of selected samples, which was determined in the laboratory at room temperature and sufficient lighting, without extraneous noise and drafts using the senses. After analyzing the requirements for the organoleptic characteristics

of yoghurts, it was found that when assessing, one should pay attention to the consistency uniformity, the presence of inclusions, the presence of foreign odors and flavors, as well as the uniformity of color. The results of a comparative organoleptic assessment of the quality of the samples are shown in Table 1.

**Table 1**

Research results of the study of organoleptic indicators of the test samples

Sample	Taste and odor	Consistency	Colour
1	Pure fermented milk, without foreign tastes and odors	Homogeneous, gentle, no gas formation	Milky white
2	Moderately pronounced, pure fermented milk, without foreign tastes and odors	On the surface there is a stratification of whey and a clot, with an undisturbed clot, without gas formation	White
3	Moderately expressed fermented milk, slightly sour, without foreign tastes and odors	Homogeneous, gentle, no gas formation	White
4	Pure, fermented milk, without foreign tastes and odors	Homogeneous, gentle, no gas formation	White with a yellowish tinge
5	Pronounced fermented milk, without foreign tastes and odors	Homogeneous, moderately dense, without gas formation	Milky white
6	Pronounced, pure fermented milk, without foreign tastes and odors	Homogeneous, gentle, no gas formation	Milky white
7	Moderately pronounced, pure fermented milk, without foreign tastes and odors	Homogeneous, moderately dense, without gas formation	White with a yellowish tinge
8	Pure fermented milk, slightly sour, without foreign tastes and odors	Homogeneous, moderately dense, without gas formation	White
9	Moderately expressed fermented milk, slightly sourish, without foreign tastes and odors	Homogeneous, gentle, no gas formation	White with a yellowish tinge
10	Pronounced fermented milk, without foreign tastes and odors	Homogeneous, moderately dense, without gas formation	Milky white

According to the results of a comparative organoleptic quality assessment, it was found that all the studied samples of yoghurts had the same pure, sour milk taste, without extraneous odors unusual for the product, with a well-expressed sour taste. The results of the consistency assessment indicate that on the surface of sample No. 3 there was a separation of whey and a clot, with an undisturbed clot. This is due to the fact that the lactose-free yoghurt was produced in a thermostatic way. So, as a result of a comparative organoleptic quality assessment, it was found that all the studied samples fully meet the requirements DSTU 4343:2004 «Yoghurts. General technical conditions». The second stage of the comparative merchandising assessment of selected yoghurt samples was to determine their main physical and chemical parameters in accordance with the requirements of DSTU 4343:2004 «Yoghurts. General technical requirements», the results of the study are given in Table 2.

**Table 2**Results of the study of physicochemical indicators  
of the samples under study

Sample	Titrateable acidity, °T	Active acidity (pH)	Mass fraction of fat, %	Mass fraction of dry substances, %
1	108	4.5	1.5	9.2
2	95	4.65	2.5	9.66
3	119	4.35	2.5	8.55
4	109	4.5	1.5	9.67
5	98	4.45	1.5	9.85
6	97	4.65	1.0	9.75
7	98	4.7	1.8	9.73
8	93	4.65	1.5	9.62
9	126	4.35	1.6	9.75
10	107	4.75	2.2	9.7

Titrateable acidity is a criterion for assessing the freshness and naturalness of dairy products, and for yoghurts it is normalized in the range from 80 to 140 °T. The procedure for the analysis is specified in GOST 3624-92 «Milk and dairy products. Titrimetric Methods for Determining Acidity». At the same time, the range of values of this indicator in the studied samples had a significant scope. Comparing the research results, none of the yoghurt samples exceeds the norms of the normative and technical documentation. The highest acidity index was in sample No. 9 – 126 °T. This is explained by the fact that the shelf life of this yoghurt was running up to the end, which led to an increase in the acidity of the product. Sample No. 8 had a low acidity – 93 °T, other samples had an average acidity from 95 °T to 119 °T, indicating the correctness of the technological process. For prototypes, an important indicator is the value of active acidity (pH), by increasing which it is concluded that the yoghurt is ripe (readiness). The analysis procedure is specified in GOST 26781-85 «Milk. Methods for measuring pH». As a result of the study, it was found that the range of active acidity in the studied samples had a significant range. Fluctuations in the pH value can be caused by a significant number of factors, in particular, the quality of milk used for yoghurt, the quantitative protein content in it, the nature of the fermentation process, etc. A significant increase in the pH value can be associated with the active development of the Bulgarian bacillus. Also, as a result of a comparative analysis, it was found that the active acidity of all studied samples of yoghurt did not exceed the permissible level according to DSTU 4343:2004 «Yoghurts. General technical requirements».

On the container of each test sample, the mass fraction of fat from 1.5 % to 2.5 % was indicated. The purpose of this experiment was to establish the compliance of the specified mass fraction of fat with the specified information on the consumer packaging of the samples. The analysis procedure is given in GOST 3624-92 «Milk and dairy products. Methods for the fat determination».

On each of the packages of the studied samples of package, the mass fraction of fat is indicated: on sample No. 1 – 1.5 %, on sample No. 2 – 2.5 %, on sample No. 3 – 2.5 %, on sample No. 4 – 1.5 %, on sample No. 5 – 1.5 %, on sample No. 6 – 1 %, on sample No. 7 – 1.8 %, on sample No. 8 – 1.5 %, on sample No. 9 – 1.6 %, on sam-

ple No. 10 – 2.2 %. In the course of the experiment, the mass fraction of fat indicated on the labels was confirmed.

The solids of fermented milk drinks include all chemical constituents (fat, proteins, milk sugar, minerals, etc.), which remain in the product after moisture is removed from it.

The average dry matter content depends on the quality of the feedstock and its lactation time, and in most products it ranges from 8.6 % (for low-fat fermented milk products) to 20 % (for fortified and fatty foods). For classic types of lactic acid products, the main factors determining their quality are, first of all, proteins and fat among all components of the dry residue.

The procedure for determining the mass fraction of dry substances is specified in GOST 3626-73 «Milk and dairy products. Methods for determination of moisture and dry matter».

In accordance with the requirements of DSTU 4343:2004 «Yoghurts. General technical conditions» mass fraction of dry substances of yoghurts must be at least 9.5 %. As a result of the analysis, it was found that almost all samples meet the requirements of DSTU 4343:2004. Sample No. 1 had deviations by 0.3 % of the mass fraction of dry matter, which indicates that the manufacturer did not follow the generally accepted technology for the production of yoghurts. Thus, among the presented samples in terms of the content of the mass fraction of dry substances, it is necessary to give preference to samples No. 2–10.

#### 4. Conclusions

Indicators of the studied samples of yoghurts, it was found that all yoghurts had a pure, sour milk taste, without foreign odors unusual for the product, with a well-expressed sour taste. The consistency of all tested samples was homogeneous, delicate, without visible characteristics of gas formation. The analysis of physicochemical indicators of the samples under study showed that only sample No. 1 had deviations from the standards of DSTU 4343:004 «Yoghurts. General technical requirements», namely, the content of the mass fraction of dry substances was lower by 0.3 %, which indicates non-compliance with the manufacturing technology of the product. The content of the mass fraction of dry substances of other samples was within acceptable limits. By determining the content of titrateable and active acidity, the mass fraction of fat in yoghurts, it was found that all the samples under study did not deviate from the requirements of the regulatory and technical documentation. It has been established that carrying out a commodity assessment makes it possible to obtain a set of results on the freshness of the studied samples of lactose-free and conventional (lactose) yoghurts. The obtained results are important for consumers and catering establishments, since yoghurt is the basis of a large number of sauces and dishes.

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