

## MICROBIOLOGICAL APPROACHES REGARDING THE BACTERIAL MICROFLORA IN SOME ASSORTMENTS OF DAIRY PRODUCTS

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### Abstract

In the present research were investigated some microbiological aspects of the microflora of some assortments of dairy products regarding the involvement of microbial species in fermentation processes in various periods of refrigeration according to the scheme of laboratory microbiological conduct.

The registered results through the evaluations of the number of colonies in dairy products determined by the species *Streptococcus lactis*, in various refrigeration periods regarding the quantitative study as well as its importance in the lactic fermentation, allowed us to obtain relevant knowledge specific to the microbiology of food products.

Isolation of the species from dairy products of different varieties determined a favorable saprophytic microflora in the bacteriological study of microbial cultures on culture media in different periods of refrigeration and microscopic indices of streptococcal cells specific to the species.

**Key words:** Dairy products, Bacteriology, *Streptococcus lactis*, *Staphylococcus*, Microflora.

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In the field of food microbiology, it is considered that microbial species have a saprophytic and pathogenic implication on dairy products. These are represented by the genus *Streptococcus* and other species with important characteristics. It participates in the production of different fermentations by presenting various categories of fermentations with an important role: lactic fermentation, alcoholic fermentation through which the fermentable products are metabolized by oxidation-reduction reactions under the action of enzymatic equipment [1;2;7;8].

Acidic dairy products are popular throughout the world both because of their pleasant sensory characteristics and their potential to maintain and even improve the health of consumers. From a microbiological point of view, the microorganisms used in the dairy industry must be viable, active and in significant numbers in the finished product at the time of sale to the consumer. Obtaining quality products at the world level, diversifying the assortment range of acid-lacquered products presuppose the use of extensive and modern new biotechnological processes [3;4;10].

The manufacturing technology of fermented dairy products allows the use as raw material of uncontaminated quality milk obtained from different breeds of animals, free of pathogenic species of microorganisms. In this context, milk, due to its balanced chemical

composition, is a suitable raw material for the manufacture of these products. Dairy products are of interest and are considered beneficial for the human and animal body due to their nutritional, tonic and anti-rickets, anti-anemic and anti-infectious effects. The taste and smell are specific, pleasant under the contribution of the nutritional assortment [5;11].

Some specialized studies reveal the involvement of lactic bacteria in lactic fermentations from dairy products with morphological heterogeneity: the main forms are derived from coccus, and can be presented in the form of streptococci (g. *Lactococcus* and g. *Streptococcus*), diplococci (g. *Leuconostoc*), of tetrads (g. *Pediococcus*); numerous other lactic bacteria, which present themselves in cylindrical form, sticks of variable sizes, isolated or in long chains, included in the genus *Lactobacillus*. However, lactic acid bacteria are nutritionally demanding and their multiplication takes place in environments with complex chemical composition [6;9;12;13;14].

From this point of view, the main objectives of these researches are the investigation of some microbiological aspects of the microflora of some assortments of dairy products in various periods of refrigeration according to the scheme of laboratory microbiological conduct.

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## MATERIAL AND METHOD

Microbiological laboratory research of some dairy products sold in stores in Chisinau was carried out in samples of yogurt, kefir, cow's cheese and cream at 1, 3, 6 days of refrigeration according to the scheme of laboratory microbiological conduct, which found in the determination microbial species involved in lactic fermentations, concerning the incidence of *Streptococcus lactis* species after various periods of storage from a bacteriological and bacterioscopic point of view, coliform bacteria and staphylococci.

The development of lactic streptococcal species regarding their microbial cultures on simple and special culture media and their study were carried out by visualizing their characteristics. Microbial preparations were made from native dairy products and their cultures, Gram staining, counting of microbial colonies and microscopic visualization with immersion, objective 90. The forms of bacteria were determined by microscopy and their differentiation according to microbiological laboratory methods. The microbiological investigation of dairy products was carried out in accordance with the regulated requirements for the investigation of food products in the laboratory of microbiological investigations of food products within the Diagnostic Center in Veterinary Medicine in the municipality of Chisinau.

## RESULTS AND DISCUSSIONS

Quantitative bacteriological investigations of the bacterial microflora of the species involved in lactic fermentation determined *Streptococcus lactis* regarding the assortments of dairy products allowed us to identify in comparative aspects the species *Streptococcus lactis* regarding its prevalence with fermentation activity in these research periods.

For the isolation of the *Streptococcus lactis* species, inoculations were carried out on culture media and the number of microbial colonies in the dairy products was investigated after 1 day of refrigeration was followed, figure 1.

The identification of *Streptococcus lactis* colonies during this period of refrigeration of dairy

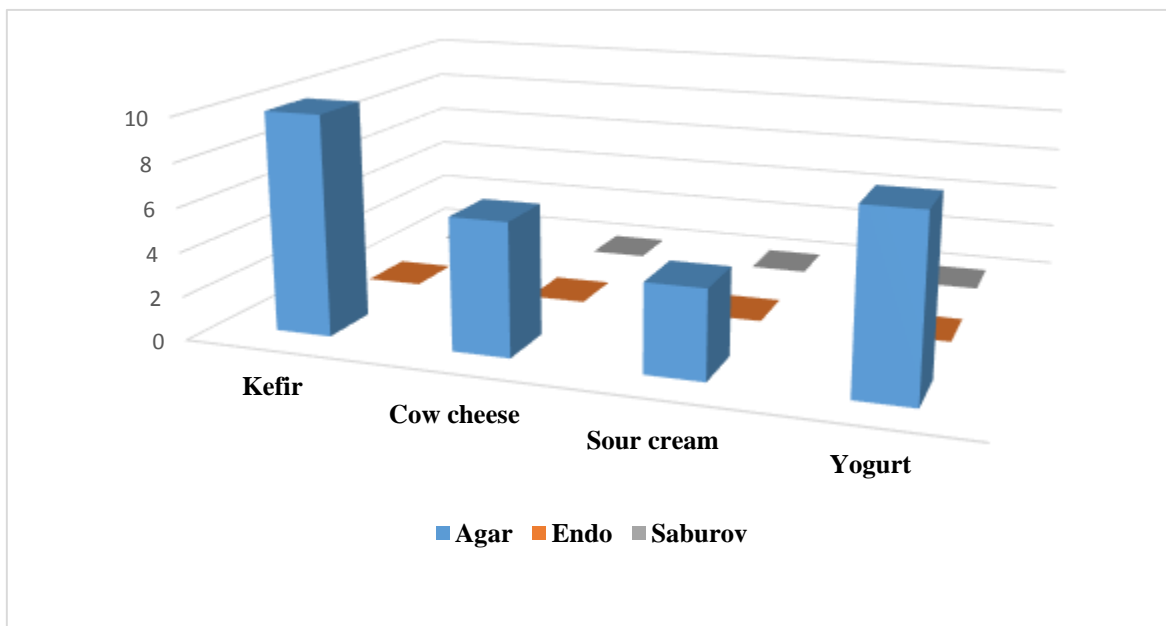
product assortments after 1 day reveals that the highest number of microbial colonies were found in the dairy product kefir-10, followed by yogurt-8 lactic colonies, cheese of cow-6 lactic colonies and cream- 4 lactic colonies of *Streptococcus lactis*.

These microbial colonies were visualized and enumerated on Agar culture medium. Microbial colonies were not identified on Endo and Saburov special media.

As a result of the research carried out in the case of the results of figure 2 regarding the results of investigations of dairy products according to the number of colonies of the species *Streptococcus lactis* after 3 days of refrigeration, some important reports were also observed emerging from the visualizations of the microbial colonies observed and listed after 3 days of refrigeration.

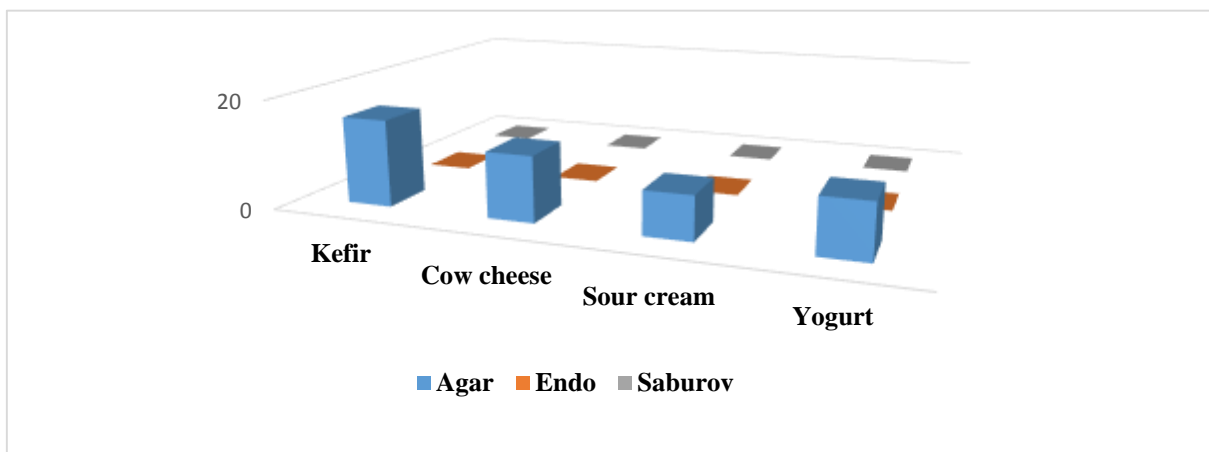
The indices of figure 2 show us that, also compared to the indices of figure 1, the highest number of microbial colonies were identified as a result of the research in the kefir dairy product, which constituted 16 microbial colonies, followed by the cow's cheese dairy product, where the number of colonies microbial colonies constituted 12 microbial colonies, followed by the yogurt dairy product where the number of determined microbial colonies of the *Streptococcus lactis* species constituted 10 microbial colonies and the cream dairy product with 8 microbial colonies. Therefore, from what has been reported, we deduce the fact that the lactic fermentation processes accelerated more intensively after the 3-day refrigeration period.

Figure 3 shows, according to the results of investigations of dairy products, that the number of colonies of *Streptococcus lactis* species after the 6-day refrigeration period varied, demonstrating important values. The results of the investigations show a predominance of the number of colonies in the kefir dairy product - 20 microbial colonies, compared to other dairy products, cow's cheese - 16 lactic microbial colonies, yogurt - 14 microbial colonies and cream - 12 microbial colonies. As can be seen from the obtained results, the dairy products show higher values of the number of colonies after refrigeration, demonstrating that the lactic fermentation processes are very intensive days without major risks for the health of consumers.



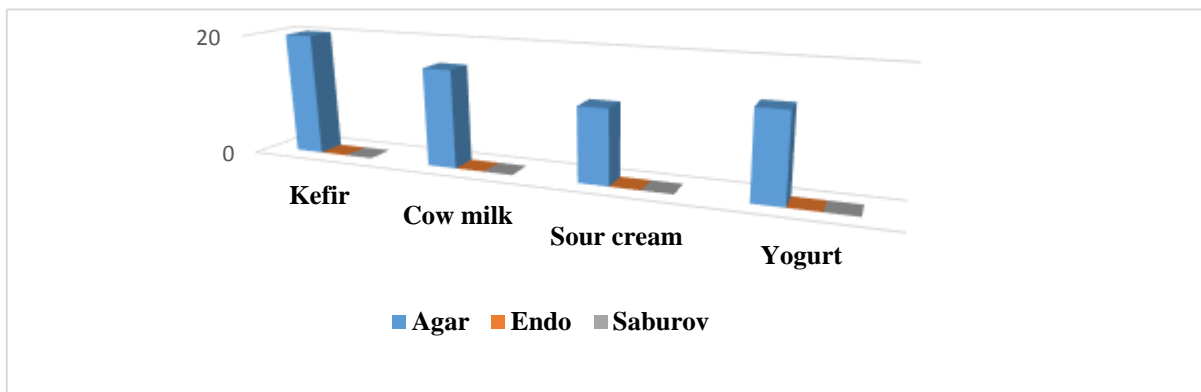
**Figure 1. Results of investigations of dairy products according to the number of colonies of the species *Streptococcus lactis* after one day of refrigeration**

*Source: elaborated by the author*



**Figure 2. Results of investigations of dairy products according to the number of colonies of *Streptococcus lactis* species after 3 days of refrigeration**

*Source: elaborated by the author*



**Figure 3. Results of investigations of dairy products according to the number of colonies of *Streptococcus lactis* species after 6 days of refrigeration**

*Source: elaborated by the author*

The species *Streptococcus lactis* participates intensively in lactic fermentation, determining important fermentative processes. Considering that many strains of lactic acid bacteria isolated from natural spontaneous microflora during cultivation processes show intensive fermentation processes, it is important to deduce that lactic acid species prevails within these processes.

From figure 4, the information emerges that during the investigation of dairy products under the microscope of the *Streptococcus lactis* species after one day of refrigeration, the indices of the lactic microorganisms specific to the *Streptococcus lactis* species constituted 10 lactic streptococcal cocci cells in the dairy kefir dairy product, compared to cheese dairy products of cow-6; sour cream - 4 and yogurt - 3 lactic streptococci.

The analysis of the research determined by the evaluation of the results of the investigations of dairy products under the microscopy of the *Streptococcus lactis* species after 3 days of refrigeration are reproduced in figure 5, which highlights the values of the lactic microorganisms listed under immersion. The microscopic-morphological study of the lactic *Streptococcus lactis* species demonstrated that the bacteria listed under microscopy possess properties characteristic of the *Streptococcus lactis* species according to the shape and location of the cells, determining under microscopy after 3 days of refrigeration values of 16 lactic streptococcal microscopic cells in the kefir dairy product, compared to other dairy products wrapped after the 3-day refrigeration period.

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Other studies investigating dairy products revealed in the dairy product cow's cheese 10 streptococcal lactic cells characteristic of this

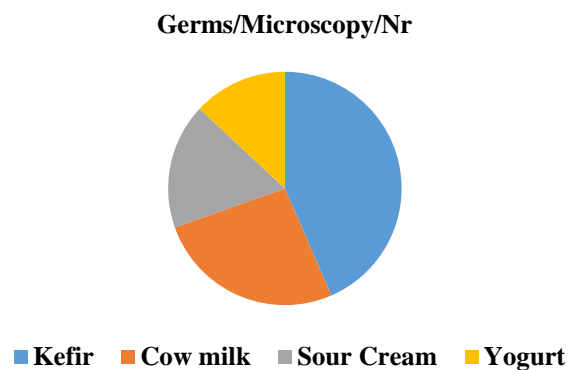
species according to the determined microscopic properties, compared to the dairy product cream one of which was observed under microscopy 8 microbial lactic cells and the dairy product yogurt, where under microscopy it was microscopically highlighted 4 lactic streptococcal cells.

A well determined stimulatory influence was best observed after the refrigeration period of 3 days however in the kefir dairy product, where similar to the number of bacterial colonies that we previously investigated were also at a growth level causing higher indices at the stages of microbiological research.

The analysis of the results of the comparative studies shown in figure 6 regarding the results of the investigations of dairy products under the microscope of the species *Streptococcus lactis* after 6 days of refrigeration indicates in the research results, that a clearly visible number of lactic streptococci after the period of 6 days of refrigeration was observed under microscopy in the dairy product similar to kefir-20 streptococcal cells, compared to dairy products, cow's cheese-16 streptococcus *lactis* microbial cells, sour cream - 12 microbial cells and yogurt-5 microbial cells.

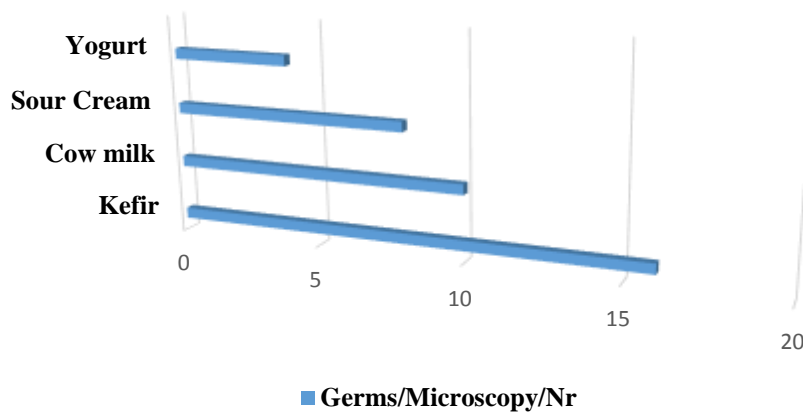
In our opinion, these microbiological investigations in various refrigeration periods according to laboratory microbiological methodology that reveal values of the lactic species *Streptococcus lactis* responsible for the fermentation processes, the value of bacterioscopic and bacteriological microbiological investigations according to the quality norms of dairy products within the limits of quality norms are appreciable of food products of lactic origin.

Due to the mechanisms of action of some lactic stimulating species from dairy products on the human and animal body, they present the resistance mechanisms against infections that sometimes intervene on the human body. However, it is current for the purpose of their subsequent use in the composition of starter cultures for the manufacture of dairy products, the effective implementation of all the isolation and identification stages of the strains of lactic microorganisms.



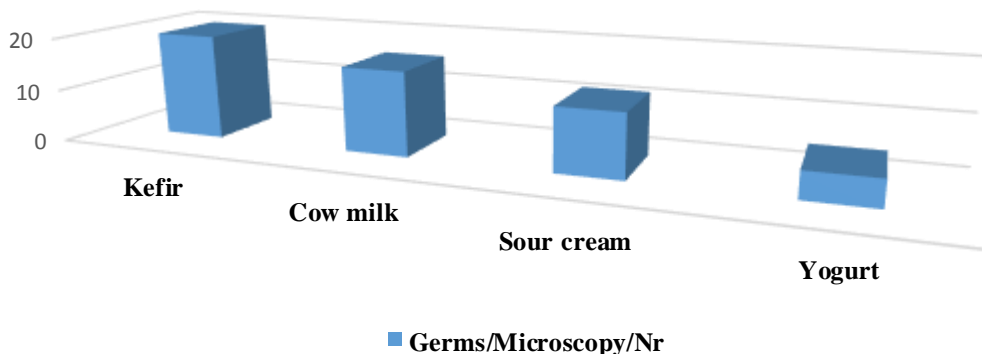
**Figure 4. Results of Streptococcus lactis microscopic investigations of dairy products after one day of refrigeration**

Source: elaborated by the author



**Figure 5. Results of Streptococcus lactis microscopic investigations of dairy products after 3 days of refrigeration**

Source: elaborated by the author



**Figure 6. Results of Streptococcus lactis microscopy investigations of dairy products after 6 days of refrigeration**

Source: elaborated by the author

## CONCLUSIONS

1. The *Streptococcus lactis* species isolated from different types of dairy products determined a favorable saprophytic microflora in the bacteriological study on microbial cultures on culture media in different refrigeration periods.
2. The bacterioscopic analysis of the microscopic indices recorded important microbiological indices of streptococcal cells specific to the *Streptococcus lactis* species between 3-20 microbial cells characteristic of the samples of dairy products investigated.
3. The bacteriological and bacterioscopic study regarding the cultural characteristics of the pathogenic species *E.coli* and *Staphylococcus* in the dairy products investigated in various periods of refrigeration determined the absence of these strains in the dairy products.
4. The microbiological investigation of dairy products during various refrigeration periods regarding the quantitative study of the *Streptococcus lactis* species, as well as its importance in lactic fermentation, allows obtaining relevant knowledge specific to the microbiology of food products.
5. To prevent the contamination of food products with pathogenic bacterial microflora, it is recommended to transport and store these products in appropriate conditions.
6. The starter cultures, due to their competitiveness and advantageous development in relation to undesirable microflora in fermentation conditions, are recommended for use on an industrial scale in the process of manufacturing dairy products.

## REFERENCES

- [1] **BANU, C.** Biotechnologies in the food industry. Technical Publishing House, Bucharest, 2000. 98p.
- [2] **COSTIN, G.** Fermented dairy products. Galati: Academic Publishing House, 2005, 384 p.
- [3] **DAN, V.** Food microbiology. Alma Publishing House, Galati, Treatise on biotechnology, vol I, Technical Publishing House, Bucharest, 2004, 45p.
- [4] **GHEORGHESCU, Gh.** Quality milk production management. Bucharest: Ed.ASAB, 2011, 189 p.
- [5] **GEORGESCU, Gh.** Milk and dairy products. Bucharest: Ed. Ceres, 2000, 57 p.
- [6] **GEORGESCU, Gh., BANU, C.** The milk producer's and processor's book. Bucharest: Ed. Ceres, 2005, 519 p.
- [7] **GUGUIANU, E.** General bacteriology. Jenus, Iasi, 2002, 206 p.

- [8] **JOSAN, N.** Microbiology and immunology. U.A.S.M. Chisinau, 2002, 638 p.
- [9] **JURCOANE, S.** Treatise on biotechnology. Vol. II, Technical Publishing House, Bucharest, 2005, 145 p.
- [10] **LEONTE, M.** Biochemistry and bakery technology. Crigarux Publishing House, Piatra Neamt, 2000, 85 p.
- [11] **NEAMȚU, G.** Food biochemistry. Ceres Publishing House, Bucharest 1997, 243 p.
- [12] **TAȘBAC, B.** General food microbiology. Bucharest: Larisa Campulung Muscel Publishing House, 2018, 225 p.
- [13] **USTUROI, M.** Control of milk and derived products. Iasi: PIM publishing house 2012. p.48
- [14] **GEORGESCU, Gh., MILITARU, E.** Analysis of milk and dairy products. Bucharest: Ceres publishing house, 2003, 64