

USE OF LACTIC YEAST BACTERIA IN THE FOOD INDUSTRY

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Abstract. Lactobacilli, also known as lactobacilli, are a genus of lactic acid bacteria. Their main difference from other microorganisms is that they are anaerobic and do not form spores, as well as being gram-positive (which means they have a permanent color). In the modern classification of the bacterial world, they are included in the class Bacilli, phylum Firmicutes, order Lactobacillales, family Lactobacillaceae, genus Lactobacillus.

Key words: streptokokklar (Streptococcaceae), xushbo'y hid beruvchi bakteriyalar (S. citrovorus, S. paracitrovorus, S. diacetilactis), L. delbruckii, L. leichmannii yoki Sporolactobacillus inulinus.

Currently, dozens of species of lactobacilli have been identified. In most cases, lactobacilli have the form of long, straight "rods" and are found singly, in groups, and in short chains. In some cases, they can also be found in a cocci-like form. The normal metabolism of lactobacilli produces hydrogen peroxide, lactate (lactic acid), lysozyme, as well as antibiotic-like substances (e.g. lactocidin, reutin, lactolin, plantaricin) [1].

The process of milk fermentation is carried out by two different families of lactic acid bacteria: lactic acid streptococci (Streptococcaceae) and lactic acid bacilli [2].

The following types of lactic acid streptococci are of greatest importance in the dairy industry: lactic acid streptococci (S. lactis), butter streptococci (S. cremoris) are homofermentative lactic acid streptococci; odoriferous bacteria (S. citrovorus, S. paracitrovorus, S. diacetilactis), thermophilic streptococci (S. thermophilus), mammococcus (Mammococcus, S. liquefaciens) are heterofermentative lactic acid streptococci [3].

actic acid bacteria are found in plants, dairy products, and the intestinal tract, and thrive in anoxic or very low oxygen conditions. They are nonmotile, nonspore-forming, Gram-stained, weakly proteolytic, and exhibit proteolytic activity in neutral media[4]. Lactic acid bacteria can be divided into two groups: those that ferment sugars to lactic acid (homofermentative lactic acid bacteria, thermobacteria (L. helveticum, L. bulgaricum, L. acidophilum, L. lactis, L. thermophilum), and streptobacteria (L. casei, L. plantarum)); ferment sugars to produce lactic acid, acetic acid, alcohol, and carbon dioxide (heterofermentative lactic acid bacteria (L. breve) [5].

Lactic acid bacteria contain the basis of probiotics. Their main biological properties are that they are lactic acid fermenters. They break down sugars to produce more than 50% lactic acid. The formation of lactic acid with bacteriocins and biologically active substances stops the growth of harmful

microbes, cleanses the body of toxins, and strengthens the immune system. They have anticancer, antiatherosclerosis, and antiallergic effects, have antioxidant effects, and protect against radiation [27].

All lactic acid bacteria (which are lactobacteria) are gram-positive, facultative anaerobes. Lactic acid bacteria include mesophiles (which grow well at temperatures around 30°C) and thermophiles (*S. thermophilus*, *L. bulgaricum*, which have a favorable temperature range of 40-50°C) [4].

Lactic acid bacteria need a complete set of essential amino acids, B12 vitamins, and nucleic acid components, which determines their distribution in nature [1].

Lactic acid bacteria live mainly on plants, fruits, vegetables, in the gastrointestinal tract, in milk and dairy products, as well as in places where plant residues rot [2].

Lactose and maltose are used as carbon sources [3].

The pH environment favorable for the development of lactic acid bacteria is around 4. Lactic acid bacteria produce 1-3.5% lactic acid. All of them use carbohydrates as an energy source and secrete lactic acid. Lactic acid bacteria have only the ability to ferment; they do not have hemoproteins (cytochromes and catalase). Despite being anaerobic, they can grow in the presence of oxygen in the air, but they are still aerotolerant [1].

Another distinguishing feature of lactic acid bacteria is their requirement for nutrients for growth. None of the members of this group can grow in media containing glucose and ammonium salts. Most of them require vitamins (lactoflavin, thiamine, pantothenic, nicotinic and folic acids, biotin) and amino acids, as well as purines and pyrimidines [4].

These bacteria can be grown mainly in complex nutrient media containing large amounts of yeast extract, tomato juice, whey and even blood [2].

Thus, lactic acid bacteria are "metabolic invalids" in their generation, having lost the ability to synthesize various metabolites as a result of their specialization (growth in environments rich in milk and other nutrient substrates). On the other hand, many of them have abilities that many other microorganisms do not have (the ability to use milk sugar lactose). In this feature, they are similar to most intestinal bacteria [4].

Lactic acid fermentation is used in the dairy industry to produce sourdough, cottage cheese, sour cream, yogurt, butter, acidophilic milk and acidophilic sourdough, cheese, fermented vegetables, bread yeast and lactic acid. Lactic acid bacteria are also widely used in silage production, fur skins and lactic acid production [3].

Studies on the use of lactic acid bacteria in the maturation of some types of sausages, salted-boiled meat products, as well as weakly salted fish, have yielded positive results [1].

The use of lactic acid bacteria to obtain lactic acid, which is used in soft drinks, is also of industrial importance. Pure lactic acid, which is used for various industrial purposes and as a food additive, can be obtained by fermentation. Milk or whey is fermented using *L. casei* or *L. bulgaricum*. *L. delbrückii*, *L. leichmannii* or *Sporolactobacillus inulinus* are used to ferment glucose and maltose. Melissa and malt also serve as necessary growth factors [4].

Lactic acid bacteria are used in the pharmaceutical industry to restore the normal microflora of the intestines and the female reproductive system (after infectious diseases and the use of antibiotics) [1]. Lactobacilli produce antibiotics. *L. acidophilum* - acidophilin and lactocidin, *L. plantarum* - lactolin, *L.*

brevis - brevin and hakozeles. In addition, lactobacilli have the ability to produce lysozyme and activate phagocytosis (the engulfment of pathogenic microorganisms by blood cells and phagocytes), accelerate the secretion of digestive secretions (saliva and gastric juice). *Helicobacter pylori* (the causative agent of gastritis and peptic ulcer disease), *Klebsiella*, *Proteus*, *Enterobacter*, *Citrobacter*, *Pseudomonas aeruginosa*, *Candida fungi* cannot resist the action of lactobacilli. Even pathogenic enterobacteria – *shigella* (causing enterocolitis) cannot withstand the action of *Lactobacillus*. In addition, in the oral cavity, lactic acid bacteria inhibit the growth and reproduction of streptococci and staphylococci (causing angina and other inflammatory diseases of the upper respiratory tract) [5]. Another important activity of lactobacteria is their participation in the formation of systemic and local immune resistance of the host organism. This is due to the universal immunomodulatory properties of lactobacilli. Lactobacteria form associations with the intestinal mucosa, work together with epithelial and immunocompetent cells, M-cells of Peyer's patches (which are a subset of lymphoid tissue). By activating the mechanisms of humoral and cellular (direct cellular immune) responses, lactobacilli activate the immune system, as well as stimulate the activity of the reticuloendothelial system, the intestinal tract, and a number of cytokines (cells that control the processes of immune formation). Lactobacilli accelerate the proliferation (multiplication) and differentiation (ability to perform a specific role) of immunocompetent cells, stimulating the production of immunoglobulins at the local and systemic levels [3].

Representatives of lactic acid bacteria significantly enhance the cytotoxic activity of T-lymphocytes, macrophages and natural killer cells, exerting anticancer properties. Thus, lactobacilli not only kill pathogenic cells themselves, but also activate the human body's own anticancer forces [4].

Recent studies have shown that representatives of the *Lactobacillus* genus participate in the formation of the phenomenon of "oral tolerance" to food antigens, that is, they help the body fight allergies caused by food allergens. Lactobacilli also stimulate intestinal contractility, which helps in the digestion of food and the removal of "waste". Sour taste activates unconditioned digestive reflexes, such as the activation of secretory functions [2].

List of used literature:

1. Артюхова С. И. Способ производства сметаны // Омск: Омский центр научно-технической информации, 2001. – С. 6.
2. Алешкин В. А. Пробиотические микроорганизмы – современное состояние вопроса и перспективы использования. – Молочная промышленность. – 2003. – № 1. – С. 59-61.
3. Антонова В. С., Сечина М. А., Соловьев С. А. Технология молока и молочных продуктов. – Издательский центр ОГАУ, 2001. – С. 440.
4. Ассонов Н. Р. Микробиология. – М: Колос, 2002. – С. 352.
5. Ахатова И. А., Мурсалимов В. С., Зорин А. Г. Усовершенствовать технологию производства и переработки кобыльего молока. – Уфа: БНИИСХ, 2000. – С. 15.