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## COMPOSITE FOOD PRODUCTS AS A RESULT OF AN INTEGRATIVE PROCESS. (Composite Smart Dairy Food Products as a Result of an Integrative Innovative Technological Process Incorporating Elements of Artificial Intelligence and Artificial Neural Networks)

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### Abstract

The text examines the widespread misconception regarding the harmful effects of butter due to its cholesterol content. It emphasizes that cholesterol itself is essential for the human body, while the actual risk arises from metabolic disorders leading to its excessive accumulation in blood vessels. It is noted that moderate consumption of butter (up to 10 g per day) does not pose health risks to healthy individuals and may have beneficial effects on vision, skin, hair, bone, and muscle tissue due to its content of fatty acids, vitamins, calcium, phospholipids, and essential amino acids. Particular attention is given to the fact that a significant proportion of nutrients is destroyed during heat treatment; therefore, butter is recommended to be consumed in its natural form, added to prepared dishes. The conclusion highlights the safety and benefits of moderate butter consumption within the framework of a balanced diet.

**Keywords:** Composite products; Composite food products; Integrative innovative technological process; Cholesterol; Regulatory standards requirements; Permissible caloric intake; Beneficial unsaturated fatty acids; Essential amino acids; Innovative practice

**Criteria and Methods for Achieving the Ideal Final Result in the Innovative Modification and Optimization of Large-Scale Continuous Automated Production Complexes in the Dairy Industry Utilizing Artificial Intelligence and Artificial Neural Networks in Control and Monitoring Systems**

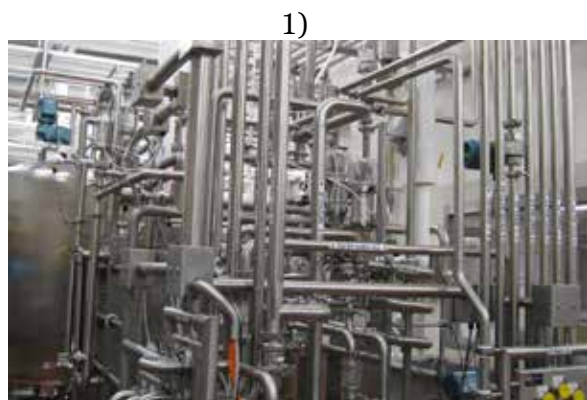
The author of the present publication notes that among the first to formulate the task of achieving the Ideal Final Result (IFR), in accordance with the updated and modified 40 Inventive Principles, as well as with the methods and tools of TRIZ (Theory of Inventive Problem Solving) and ARIZ (Algorithm of Inventive Problem Solving),

were prominent innovation specialists and technologists of modern dairy enterprises.

According to their conceptual methodology, the application of criteria and methods for achieving the Ideal Final Result in the comprehensive evaluation of innovative solutions yields exceptionally high levels of effective-

ness and accuracy. When combined with other analytical approaches, this framework significantly increases the proportion of successful startups and, consequently, substantially enhances the efficiency of implementing new digital technologies within large-scale automated dairy production systems.

**Figures 1, 2, 3**



***Figures 1, 2, and 3 present photographs of state-of-the-art technological equipment used in the production of high-quality dairy products that fully comply with the stringent requirements of current regulatory standards***

At present, the development trajectory of innovative technologies also encompasses the production of so-called smart food products. In this context, the manufacturing of composite food products is advancing through the active integration of artificial intelligence (AI) and artificial neural networks (ANNs) into control and monitoring systems. In the near future, such production systems are expected to transition toward the use of quantum computing technologies and various processor modules developed on their basis.

Innovative practice has demonstrated that this level of integrated system architecture significantly increases the accuracy and speed of control and management processes. These processes are built upon the principles of electromagnetic resonance spectroscopy

and incorporate flexible analytical processing of measurement results, again utilizing elements of artificial intelligence and artificial neural networks to enhance precision, adaptability, and overall operational efficiency.

**Figure 4.**



**Figure 4 presents one of the modules of this technological equipment, characterized by an exceptionally**

**high density of component integration and assembly.**

**Figure 5.**



**Figure 5 illustrates the types and variants of composite dairy products.**

### **Composite Dairy Food Products as a Result of an Integrative Innovative Technological Process**

A widespread misconception suggests that butter is harmful due to its high cholesterol content. However, cholesterol itself is not inherently dangerous; on the contrary, it is essential for the human body. The actual health risk arises from metabolic disorders that lead to excessive cholesterol accumulation on blood vessel walls.

The consumption of butter, when moderate, does not cause such severe consequences. It is beneficial for vision; ophthalmologists often refer to it as contributing to the preservation of ocular youthfulness. Butter contains fatty acids and numerous vitamins that support overall physiological functions.

Nutritionists recommend that healthy individuals consume up to 10 grams of fresh butter per day, which falls within acceptable caloric intake limits. Butter should preferably be consumed in its natural form, as heat treatment results in the loss of more than 50% of its nutrients, the destruction of vitamins, and the conversion of beneficial unsaturated fatty acids into less desirable saturated forms.

Butter is not only nutritious but also beneficial for the skin, hair, vision, bone, and muscle tissue. It is rich in vitamins and calcium, and it contains phospholipids necessary for cellular structure, particularly nerve cells. In addition, butter includes essential amino acids required for normal physiological func-

tioning, which must be obtained from dietary sources. Therefore, the beneficial properties of butter are well substantiated. It should be noted, however, that melting butter during frying significantly reduces its vitamin content; thus, it is preferable to add butter to prepared dishes.

Although butter contains cholesterol, it becomes potentially harmful only when fatty foods are consumed excessively. In moderate amounts, cholesterol is necessary, as it participates in the formation of vascular cell membranes. Accordingly, one or two slices of bread with fresh butter per day are unlikely to pose any health risk.

### **Twenty Fundamental Principles and Characteristics Explaining the Unique Properties of Butter**

1. Butter is rich in the most bioavailable form of vitamin A, essential for the proper functioning of the thyroid and adrenal glands.
2. Butter contains lauric acid, which is important for infection prevention and the development of biological defense mechanisms.
3. Butter contains lecithin, which supports the stabilization of cholesterol metabolism.
4. Butter contains antioxidants that protect the body from oxidative stress and free radical damage.
5. Butter's antioxidant components help protect the circulatory system from weakening and thinning of arterial walls.
6. Butter is an important source of vitamins E and K.
7. Butter is a rich biological source of selenium, a vital trace mineral.

8. The saturated animal fats in butter may exhibit properties that help inhibit the development of certain tumors.
9. Butter contains amino acids that may support muscle development and immune function.
10. Vitamin D found in butter plays a significant role in calcium absorption.
11. Butter contributes to the protection of dental enamel.
12. Butter contains factors that may help protect joints from stiffness.
13. The fatty acids in butter may help prevent arterial calcification.
14. Butter is a source of “Activator X” (often associated with vitamin K2), which supports the absorption of beneficial micro-nutrients.
15. Butter contains iodine in a highly absorbable form.
16. Butter may support reproductive health in women.
17. Butter serves as a rapid source of energy.
18. The cholesterol present in dairy fat plays an important role in the development of the brain and nervous system in children.
19. Butter contains arachidonic acid (AA), which plays an important role in brain function and cellular structure.
20. Butter may provide protective effects against gastrointestinal infections, particularly in early childhood and old age.

If needed, I can further adapt this text into a formal scientific article format with structured sections (Introduction, Materials and Methods, Results, Conclusion) or align it with academic publication standards.

**Figure 6.**



**Companies–developers** propose an integrated group technology for the production of ultra-pure food composites for the following product categories:

- **Homogenized Meta-Pure Food Composition – Cream**
- **Homogenized Meta-Pure Food Composition – Butter**

Depending on the selected market entry strategy and product positioning, innovative companies hold patent ownership rights and may grant licenses for the use of the following universal technologies, including nano-technologies:

- **Active non-contact real-time online monitoring technology** for determining the composition and concentration of components in liquids, including cow’s milk, with the capability of controlling somatic cell count and more than twenty additional key components and quality parameters of raw milk;
- **Reagent-free cleaning, sterilization, and disinfection technology** for technological pipelines and process tanks in dairy production lines;
- **Three-dimensional dynamic homogeneous fermentation technology** for dairy products;
- **Vortex micro-aeration technology** for dairy matrices;
- **Hydrodynamic harmonic pulsating shock kinetic impact technology** applied to liquid volumes (including milk, cream, and sour cream).

A special role in this process is played by innovative concepts and enabling technologies. Food products, similarly to pharmaceutical preparations and, to a certain extent, cosmetic products, constitute a strictly quality-controlled sector within the innovative technological landscape.

This sector is primarily characterized by the mandatory full compliance of new innovative products and technologies with public health standards and increasingly stringent environmental regulations.

It must also be acknowledged that this technological field is significantly influenced by established traditions, as well as climatic and cultural characteristics specific to the re-

gion in which the innovative product is introduced to consumers.

At the same time, it is important to recognize that the most successful local innovative solutions and inventions – especially those applicable not only within the limited scope of food production but also across broader technological domains – can serve as effective driving forces in the progressive development of integrative innovative technologies.

**Figure 7.**



***New Technology of Hydrodynamic Mixing of Various Liquid Components with Simultaneous Whipping in a Dynamic, Periodically Repeating, Developed Kinetic Regime with Regeneration of Accumulated Kinetic Energy***

**Рисунки 9, 10, 11, 12, 13;**



***and Its Sequential Transfer into the Process***

**Figure 8.**



The proposed innovative technology represents a process of dynamic impact on liquid or semi-consistent components being mixed and whipped.

The most extensively studied and frequently applied components within this process, in various configurations, are derived from dairy products.

The developing company is conducting research and development activities aimed at designing specialized technological equipment to implement this process. The objective of these research, engineering, and industrial design efforts – along with the development of dietetic algorithms and process control

programs – is to identify new approaches to the production of composite, compounded, or homogeneously integrated food products characterized by reduced or minimized fat content and, conversely, increased concentrations of vitamins and biologically active elements.

An additional objective of the proposed process is to enable, without thermal treatment or other conventional product-altering methods, the formation of mixtures or whipped composite systems – primarily dairy or fermented dairy-based – which under standard conditions would either not mix

at all, mix poorly, or form unstable emulsions or suspensions.

This technology therefore aims to create stable, structurally integrated food systems through controlled hydrodynamic kinetic activation rather than through heat-based processing or chemical modification.

Образцы композитных продуктов.

## Appendix 1.

There are 20 basic principles and features that reveal and explain the unique properties of butter:

1. Butter is rich in the most easily absorbed form of vitamin A by the body necessary for normal functioning of the thyroid and adrenal glands
2. Butter Contains laurel acid (lauric), the presence of which is extremely important in terms of prevention and the prevention of infections and the accumulation of biological mechanisms of resistance to infection
3. Butter contains lecithin, the basis for the stabilization of the biological mechanism for the formation of cholesterol metabolism.
4. Butter contains antioxidants that protect the body from the spontaneous and radical biological degradation
5. Butter has in its composition of antioxidants that protect the body's circulatory system from weakening and thinning of the walls of the arteries.
6. Butter is an important and effective source of extremely useful vitamins E and K.
7. Butter is a very rich and unique biological sources vital for the body's mineral selenium.
8. Saturated animal fats in butter have strong influence on the properties to prevent the formation of a variety of tumors and cancer.
9. butter contains amino acids, which are a powerful agent prevents the formation of cancerous tumors, stimulates the development of muscles and stimulating factor for the restoration of immunity and inviolability.
10. Vitamin D is found in the oil significantly affects the absorption of calcium.
11. Butter protects against decay of the tooth enamel.
12. Butter is the only source factor that protects against hardening of the joints.
13. Factor presence of fatty acids in butter also prevents calcification of the arteries, streams, and hardening of glands.
14. Butter is a source of Activator X, which helps your body absorb the beneficial minerals.
15. Butter contains iodine very absorbed form.
16. Butter can promote reproductive functions in the body in women.
17. Butter is a source of quick energy.
18. Positive Cholesterol that soldierships in milk fat lochan important for the development of a child's brain and nervous system development.
19. Butter Containing Arachidonic acid (AA), which plays an important role in brain function, and is a vital component of cells.
20. Butter protects the body from the gastrointestinal infections in the very young or the elderly

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