

# Indicators Providing Quality and Safety of Food Products



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## Abstract

The analysis and evaluation of fats used for food production has been carried out. The quality and nutritional value and safety of food products are determined. The characteristics of the acid composition and energy value of oils and fats are given.

**Keywords:** Fats; Variety; Quality; Acid composition; Nutritional value and safety; Biological value; Hygienic requirements

## Introduction

Food products are objects of animal or vegetable origin used for food in natural or processed form as a source of energy, food and flavoring substances [1,2]. For food production are used food raw materials, which are objects of vegetable, animal, as well as mineral origin and water.

Food products are divided into the following groups [2]

- a) The products of mass consumption developed according to traditional technology and intended for nutrition of the main population groups.
- b) Medicinal (dietary) and medical-prophylactic products-specially created for preventive and therapeutic nutrition; characterized by a changed chemical composition and physical properties. This group includes foods: vitaminized, low in fat (33% fat reduction), low-calorie (less than 168 kJ / 100 g), high in fiber, low in sugar, cholesterol, sodium chloride and other substances.
- c) Baby food products - Special requirements for food and safety are applied to baby food products. To produce them, high-quality raw materials are used, and special recipes and technologies are developed. Specialized baby food products are produced on a dairy, cereal basis.

Nutritional value is a concept reflecting the fullness of the useful properties of a food product, including the degree to which a person's physiological needs are maintained in basic nutrients, energy and organoleptic properties. This indicator is characterized

by the chemical composition of the food product, taking into account its consumption in the conventional amount. All substances that make up food and meals are divided into two groups: organic (proteins, carbohydrates, fats, food acids, vitamins, enzymes) and mineral (water, macro and microelements). Among them there are substances that determine the nutritional, including energy and biological, values that are involved in the formation of the structure, taste, aroma and color of foods [3]. Nutritional value is determined not only by the content of biologically active substances (nutrients), but also by their ratio, digestibility and good quality. The terms "energy" and "biological" value are a narrower concept of nutritional value. The energy value characterizes that part of the energy that can be released from food in the process of biological oxidation and used to provide physiological functions of the body. Food is the only source of energy for humans.

The amount of energy released when the body absorbs food is called caloric value. When oxidizing one gram of fat, the body receives 9 kcal (37.7kJ); one gram of protein - 4 kcal (16.7kJ); one gram of carbohydrates - 3.75 kcal (15.7 kJ). This is the gross calorie, i.e. the one that is contained in the product and is released during its combustion, or the theoretical energy value. But nutrients are not fully absorbed by the body. So, proteins are digested by 94.5%, fats - by 94.0%; carbohydrates - by 95.6%. Therefore, the theoretical energy value should be multiplied by the coefficient of digestibility. The coefficient of digestibility of sucrose is equal to 1, animal fat 0.85 (excluding butter), vegetable fats 0.95, and proteins depending on their nature 0.85-0.95. Knowing the content in

the diet of proteins, fats and carbohydrates and the coefficients of their digestibility, you can easily calculate the actual energy value. Foods included in the diet should contain substances necessary for energy, metabolism and tissue building. It is important for the body which groups of nutrients provide caloric intake. For normal human activity, a certain ratio of proteins, fats and carbohydrates, as well as the presence of vitamins and minerals, is necessary.

Proteins should be, on average, 12%, fats 30-35% of the total caloric intake, the rest - carbohydrates. At present, the energy value of a popular diet corresponding to the average energy expenditure of a person is 2000-2.500 kcal (8.380-10.500 kJ). The composition of this diet consists mainly of products subjected to cooking, preserving and storage, hence, with a low content of vitamins and other biologically active substances. How to provide in this amount of energy necessary for the body nutrients? This indicator is called the dietary density of the diet; is characterized by an amount of essential nutrients in 1000 kcal (4190 kJ). The problem of dietary nutritional density can be successfully solved by producing low calorie foods of high nutritional value enriched with essential nutrients [4]. The biological value of food is determined mainly by the presence in them of irreplaceable nutritional factors, not synthesized in the body or synthesized in limited quantities and at low rates. The main irreplaceable components of food include 8-10 amino acids, 3-5 polyunsaturated fatty acids, all vitamins and most of the mineral substances, as well as natural physiological substances of high biological activity: phospholipids, protein-lecithin and glycoprotein complexes. The biological value of food is a more general concept and is characterized by the biological value of proteins, fats, carbohydrates, vitamins and minerals. The biological value of fats is determined by their polyunsaturated fatty acids (PUFA), called vitamin PUFAs, which are irreplaceable nutritional factors, since they are not formed in the body and must be supplied with food. Along with the energy function, PUFAs promote the acceleration of cholesterol metabolism in the body, reduce the formation of low density lipoproteins, responsible for atherosclerosis, and reduce the synthesis of triglycerides.

Essential fatty acids are linoleic C 18: 2 and linolenic C 18: 3. Linoleic acid is converted into arachidonic C 22: 4, and linolenic acid - into eicosapentaenoic acid. Inadequate intake of linoleic acid from food causes in the body a disruption of the biosynthesis of arachidonic acid, which enters a large number in its structural lipids, as well as prostaglandins. Arachidonic acid accounts for 20-25% of all fatty acids in the phospholipids of cellular and subcellular biomembranes. PUFAs derived from linolenic acid (eicosapentaenoic and docosahexaenoic) are also constantly present in membrane lipids, but in a much smaller amount (2 to 5%) than arachidonic acid [5]. It is important to emphasize that the methods for determining the biological value of fats are integral, since they do not reveal the effect of each of the acids on the metabolism of lipids. Unlike proteins, it is currently not possible to determine the biological value of fats based on their chemical composition. AA Pokrovsky noted that one of the most promising approaches in solving this problem is the study of the effect of fats on the fatty acid composition of cell

membranes [6]. He was shown that food lipids can have a significant effect on the structure and function of membranes, changing their fatty acid spectra.

To evaluate the biological effect of various fats, the concept of the fatty acid metabolization efficiency factor (FME) was introduced on the human body. It characterizes the ratio of the amount of arachidonic acid to the sum of all other polyunsaturated acids with 20 and 22 carbon atoms. It is important to note that FME increases in parallel with a decrease in the content of arachidonic acid. The prospect of the possible use of FME as a diagnostic test for the detection of lipid metabolism disorders is necessary. In general, quality is defined as the totality of the characteristics of an object related to its ability to meet stated and perceived needs [7]. With regard to food products, quality is a combination of properties that reflect the ability of the product to provide organoleptic characteristics, the body's need for food substances, its safety for health, reliability in manufacturing and storage. The quality of food products is of decisive importance, since it affects the processes occurring in the body. In the formation and preservation of the quality of food, many factors are involved, the most important of which are the following: the quality of the original components and recipes, production technologies and equipment, production processes, storage and sale. The nomenclature of quality indicators (QI) includes single QIs that characterize one of the properties of the product; group of QI used to evaluate a set of basic properties, and complex (generalized) QI that determine the quality of the product as a whole. In addition, the term "relative indicator" is used, which is determined by the ratio of similar QI of the compared products. Group indicators are divided into such as ergonomic, aesthetic, patent legal, unification and standardization, environmental, designation, technological, economic, maintainability, transportability, safety of consumption, etc [8]. Hygienic indicators characterize good quality, and conformity of a product to sanitary norms.

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