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SUBSTANTIATION OF TECHNOLOGY OF HIGH-PROTEIN GALLETS ON THE BASIS OF BIOMASS.

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Egorova Svetlana Vladimirovna,

Ph.D., associate professor of Moscow State University of Technology and Management named after K.G. Razumovsky (First Cossack University), Moscow.

Maryinskaya Anna Andreevna,

Bachelor of Moscow State University of Technology and Management named after K.G. Razumovsky (First Cossack University), Moscow.

Erzin Nikolay Alexandrovich,

Research Engineer, Moscow State University of Technology and Management named after K.G. Razumovsky (First Cossack University) Moscow.

ABSTRACT

Protein deficiency is a global problem. The increasing demand for meat may exacerbate the environmental problem, as Every year, the percentage of greenhouse gas emissions resulting from agricultural production increases. An alternative source of protein is the high-protein biomass of *Musca Domestica* larvae, grown on the waste of grain processing and agricultural production, which can be used to produce new functional products containing a significant amount of protein in their composition. The development of the recipe and technology of Guardsman high-protein biscuits based on wheat wallpaper flour using high-protein biomass will increase the nutritional value of rations and become indispensable in the nutrition of climbers, military and athletes.

Key words: cereal products, high protein biomass.

People involved in various active activities lead a separate lifestyle. As a rule, these are the military, travelers, athletes. The activities of such people are associated with intense physical activity, based on an increase in strength and endurance, which leads to large expenditures of energy and loss of muscle mass, which require constant replenishment for the further continuation of a certain series of actions depending on their activity. The replenishment of these resources is mainly due to food intake, not all products cope with the task. For the nutrition of individuals whose life is based on high energy consumption, a number of products are recommended that make up a special balance of proteins, fats, carbohydrates, vitamins and minerals in them. For groups of people with increased energy consumption, a special balanced diet is created, which includes a certain set of products presented in the form of dry rations [1, p. 115].

Packs of Russia is called IRP (Individual Diet), it includes four cans (canned meat (stew), canned meat in the form of minced or pate, buckwheat and rice porridge with beef and canned fish), 6 packs of army bread, instant tea with sugar 2 packets, a concentrate of dry natural drink Molodets, instant coffee 1 packet, sugar, 4 packets, fruit jam, tomato sauce, 1 tablet of multivitamins. American dry packs are called MRE -

Meals, Ready-to-Eat. (Food Ready-To-Eat). Each single MRE package usually contains: meat, side dish, crackers (biscuits), peanut butter, sweets, coffee, tea, etc. German dry packs are called Military Combat. Composition: 2 main dishes and appetizer. Also included are crackers (biscuits), instant porridge, fruit salad, instant coffee / tea, tea, chocolate, chewing gum, sugar and salt, jam.

Biscuits are part of the dry packs of different countries and are part of the main diet. Biscuit - a solid dry cookie or cracker that is made only from flour and water (fresh and unsalted). Since the cookies are very dry, it can be stored for a long time without cooling, withstand the effects of all kinds of harmful microorganisms and bread pests, unlike bread. That is why biscuits are indispensable food during sea voyages, hiking trips, as well as various long-term expeditions.

Varieties of biscuits differ among themselves depending on additives, on the type of flour used and on their application. Biscuits made of premium flour used in modern rations have lower calorie content and lower protein content compared to biscuits on wheat wallpaper flour with the addition of high-protein biomass.

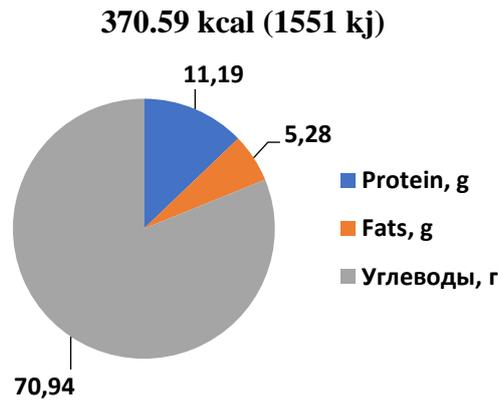


Figure 1. Biscuits on premium flour

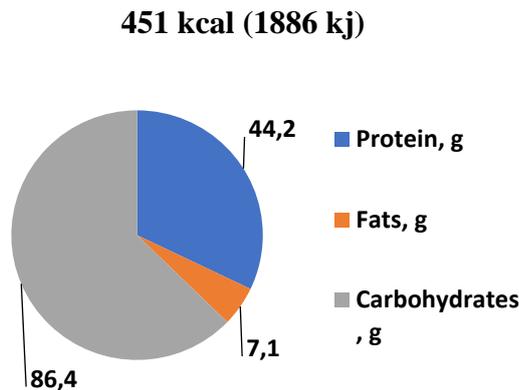


Figure 2. Wallpaper biscuits with high protein biomass

Categories of people, such as the military, climbers and athletes, devote most of their time to physical activity, so they should eat a lot of protein, because it is this component of food that is responsible for muscle structure. A high level of protein nutrition has a positive effect on overall performance, increasing it, as well as reducing fatigue and the most rapid recovery of strength and performance [1, p. 70].

Proteins are one of the sources of energy in the cell. During the breakdown of 1 g of protein to final products, about 17 kJ (4 kcal) is released. However, proteins are used as an energy source, usually when

other sources, such as carbohydrates and fats, are depleted.

With prolonged starvation, glucose is synthesized from amino acids, while muscle mass is reduced. A number of amino acids are glucogenic, that is, their carbon skeletons to one degree or another are able to be included in glucose. With prolonged starvation, glucose is synthesized from amino acids, while muscle mass is reduced. A number of amino acids are glucogenic, that is, their carbon skeletons to one degree or another are able to be included in glucose.



Figure 3. Synthesis of glucose from amino acids

The need for carbohydrates in active people is quite high. Food intake should contain polysaccharides (starch and glycogen), disaccharides (sucrose) and monosaccharides (glucose, fructose, lactose). In a period of stressful conditions, disaccharides and monosaccharides are important, as they are easily absorbed and their energy is quickly used. Most

carbohydrates enter the body in the form of starch, which is found in large quantities in plant foods - bread, various cereals, and vegetables. Their assimilation is preceded by a process of rather slow digestion and absorption, and thus, their intake never causes significant hyperglycemia.

Table 1

**NUTRITIONAL COMPOSITION AND ENERGY VALUE OF PEOPLE INVOLVED
IN INTENSE PHYSICAL ACTIVITY**

Indicators per day	Climbers	Military	Athletes
Kcal	4000-5000	4617	6000
Protein, g	100-150	134	210
Fats, g	100-130	164	167
Carbohydrates, g	670-800	620	915

To quickly replenish the body's energy reserves at a distance or on the road, for example, when an athlete, military man or climber experiences weakness and an acute feeling of hunger, which signals the depletion of glycogen in the body and a decrease in blood sugar, and before the finish or intended breakdown close, you need to use a pocket-high-calorie food stored for this case, containing a significant amount of protein and easily digestible carbohydrates. Food should be high-calorie, benign and tasty, light in weight and volume, easily and

quickly cooked. It is necessary to provide a large and varied assortment [2, p. 67].

High-protein biscuits can be part of a pocket rations, which plays an important role along the route along with dry rations. It is used at small halts, that is, after 45-50 minutes of movement. Its total calorie content is 200-600 kcal (5-10% of the daily calorie content) [3, p. 120].

mg / 100 g

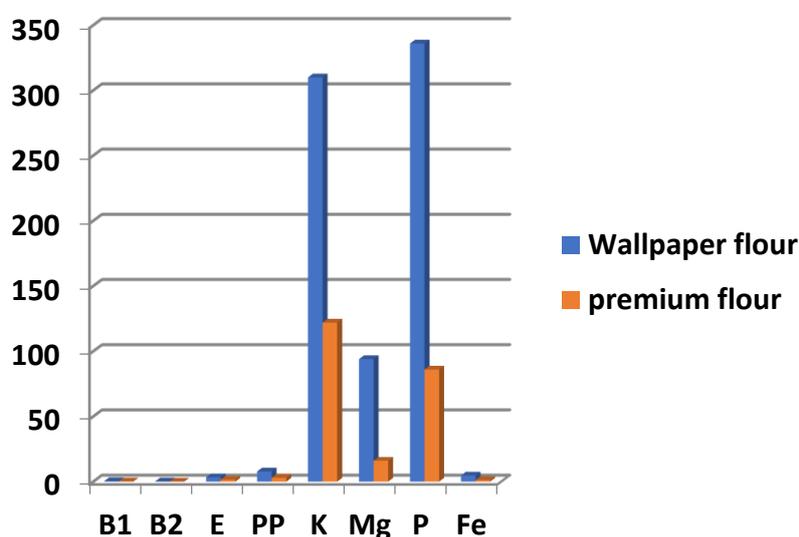


Figure 4. Comparison of the mineral composition of wheat flour and premium wheat flour, where: E is the content of vitamin E in tocopherol equivalent, PP is the content of vitamin PP in niacin equivalent

Biscuits are characterized mainly by the fact that the raw material for them is wallpaper wheat flour and high-protein biomass. At the same time, wallpaper flour contains the largest amount of fiber 1.9%, unlike wheat flour of the first grade 0.1%. A valuable quality of wheat grain is a high content of gluten (gluten), which helps to increase the nutritional value of flour by enriching it with a substance such as vegetable protein. Doctors recommend eating wheat gluten for people

experiencing severe physical exertion. Vegetable protein, which is saturated with wheat gluten, helps to strengthen the human body, increase immunity.

The beneficial properties of wheat gluten are also the presence in it of a large number of minerals and vitamins. Particular attention in the catering of climbers, military, athletes should be given to the fortification of food, since vitamins, as a rule, are not synthesized in the human body [4, p. 34].

Table 2

NUTRITIONAL VALUE OF WHEAT FLOUR

Kcal	312
Protein, g	11.5
Fats, g	2.2
Carbohydrates, g	61.5

Biomass is a valuable protein product. Another name is a protein-lipid concentrate from dried *Musca Domestica* larvae, abbreviated as BLK, which contains

substances with an energy of 20.10 MJ / kg, larvae contain 48 - 70% of crude protein. Moreover, they are very effective due to their ability to process 2 kg of feed

in 1 kg of biomass. In addition, food waste and food loss can serve as a substrate for insect protein production. Almost a third of all food produced is lost or thrown away in the world — about 1.6 billion tons annually. So such processing will help to significantly

improve the environmental and economic situation in the world, as well as provide the population with protein. The flour from *Musca Domestica* larvae has a high content of various amino acids, including arginine and lysine in an almost perfect proportion.

Table 3

NUTRITIONAL INFORMATION OF MUSCA DOMESTICA FLOUR

Kcal	252
Protein, g	70
Fats, g	15.52
Carbohydrates, g	9.78

The functional biscuit also includes water, yeast, salt, sugar and fruit and berry concentrate.

Table 4

HIGH PROTEIN BISCUIT RECIPE

Components	Ratio
Wheat flour (wallpaper)	50,0%
Musca Domestica Protein Biomass	20,0%
Common salt	4,0%
White sugar	10,0%
Yeast	6,0%
Fruit and berry concentrate	10,0%

High-protein biscuit "Guardman" is produced in the form of small figures (plates) of rectangular, round or square, the surface of which is smooth, with holes (punctures) that serve to maintain the shape of the biscuit from 0.3 to 0.6 mm on one plate.

The core technology consists of several stages.

The first stage of "preparation of raw materials" includes a laboratory study of a dry mix of biscuits on quality and safety, namely physico-chemical indicators. Then comes the weighing of the required amount of ingredients.

The second stage consists in mixing the mixture with water in a dough mixing machine about 18 revolutions for 10 minutes. The finished dough has an elastic, plastic-viscous consistency.

The third stage of "molding": The shape of the biscuits can be any: rectangular, square, round. Punctures are placed on top of the products.

Fourth stage: Baking biscuits at a temperature of 180 degrees for 7 minutes. After biscuits are cooled and packaged [5, p. 48].

To conclusion, the production of new functional biscuits using high-protein biomass grown on agricultural waste, determines the rational use of resources. High-protein biscuits may be included in pocket dry packs, as they have low weight and high

nutritional value due to the large amount of protein and carbohydrates in their composition.

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