

Researching the sports nutrition segment to develop a high-protein product

L. Prokhasko

Institute of Sports, Tourism and Service
South-Ural State University
Chelyabinsk, Russian Federation
prokhaskols@susu.ru

N. Zhuravleva

Institute of Sports, Tourism and Service
South-Ural State University
Chelyabinsk, Russian Federation
zhuravlevand@susu.ru
0000-0002-4218-8772

G. Khamraeva

Institute of Sports, Tourism and Service
South-Ural State University
Chelyabinsk, Russian Federation
khamraevagb@susu.ru

R. Fazlitdinov

Institute of Sports, Tourism and Service
South-Ural State University
Chelyabinsk, Russian Federation
rusvantus@mail.ru

Abstract—*The aim of the study was to determine the demand for foods enriched with a protein component in the consumer market as a whole and, in particular, in the sports nutrition sector, with the aim of further developing protein biscuit recipes with a high protein content. To accomplish this goal, online testing of respondents was conducted, leading a mostly healthy lifestyle - athletes, visitors to fitness clubs, students and other interested people. Analysis showed a positive trend in consumer demand - the product has good prospects. To develop protein biscuits with a high protein content, the analysis of known protein products was carried out according to a number of qualitative indicators - amino acid composition, biological value, absorption rate (protein cookies are supposed to be used as a snack before or after training, etc.), the content of proteins, fats and carbohydrates, cost. The optimal combination of these characteristics was found in whey protein concentrate, which was taken as an enrichment supplement.*

Keywords—*protein, additive, sports nutrition, component, respondent, proteins, fats, carbohydrates*

I. INTRODUCTION

Nutrition can be considered as a factor determining the state of public health. Nutrition plays a particularly significant role in the life of such a group of people as athletes, since they have a daily increased consumption of nutrients. One of the most important nutritional conditions for athletes is a high level of protein intake, which is a kind of building material for the body. One of the ways to increase the amount of protein in the diet is to enrich consumer products with protein supplements. Snack products, including cookies, which have already become a traditional product for the mass consumer, are gaining popularity.

II. LITERATURE REVIEW

The dynamic lifestyle of most residents of large cities, the negative consequences of anthropogenic impact and many other negative aspects of modern civilization often cause an imbalance in nutrition, which, in turn, leads to various diseases, and, as a result, to life shortening. This global problem can be countered by the widespread promotion of a healthy lifestyle, which is based on the development of sports practice [1] and, of course, the behavioral change in the nutrition of a modern person. The rapid expansion of the food market leads to a

catastrophically increasing range of food products: every day more and more products are thrown onto the market, which are not always useful and necessary for people. Understanding this diversity can be very difficult. And here the main role is played by the authentication of food products, which restores consumer confidence in food components and ingredients [2].

Behavioral changes in nutrition are possible if nutritional imbalance is overcome. This problem can be solved using raw materials containing physiologically functional ingredients - biologically active substances, vitamins, minerals, or enriching traditional products with additional components [3], [4], [5].

Proteins are the most important components that form the cells of the human body. They protect the body, contribute to the growth of its tissues, thereby ensuring its recovery. When performing physical exercises, proteins contribute to the production of up to 20% of energy, thereby maintaining the body's energy balance. Large physical exertion (which is typical for almost all sports) often contributes to the destruction of muscle tissue. The main assistants in the restoration of muscle tissue and increase in its volume are proteins. One of the ways to increase the amount of protein in the diet is to enrich products with protein supplements. This trend is currently global. This problem is particularly relevant in the concept of healthy nutrition [6], [7], [8], as well as in the sports nutrition sector [9], [10].

The most popular types of protein used in the sports nutrition sector are:

- Whey protein (has three forms - whey protein concentrate (WPC); whey protein isolate (WPI); hydrolyzate (WPH)).
- Casein.
- Soy protein.
- Milk protein.
- Egg white.

Each of these types of protein has its own characteristic features: fast (or slow) absorption; pleasant (or unpleasant) taste; low (or high) indicator of efficiency and biological

value; fast (or slow) dissolution; high (or low) estrogenic activity; high (or low) cost and most importantly - high (or relatively low) amino acid composition. Therefore, when choosing the type of the protein used, a qualitative analysis of the market segment of protein products is necessary [11].

The above characteristics of the protein depend primarily on the type of food product from which the protein is obtained, as well as the technology for its preparation.

Currently, innovative technologies are used to produce various types of protein, which, along with the main task of obtaining high-protein products, also carry out environmental tasks [12], [13], [14].

In order to determine the consumer trend in the field of sports nutrition, methods of direct survey, online testing, etc. [9], [10] are becoming increasingly important. This, so to speak, is a verbal-communicative method aimed at determining the prospects of an individual object, process, phenomenon, etc.

To increase the reliability of the questionnaire, as many respondents as possible should participate in this procedure. And, as experience shows, the reliability of answers with the correspondence method of survey - the respondent answers the question in the absence of the questionnaire - is higher.

This can be explained by the greater freedom of the respondent, when the absence of a questionnaire has a positive effect on the respondent. In this regard, an online survey is the best option.

III. MATERIALS AND METHODS

To start developing a food product, it is necessary to find out how much this product will be in demand, that is, to study the consumer market. This is a condition for identifying motivation and taste habits in order to best meet consumer preferences, which also provides the possibility of predicting their changes in the future.

At the same time, despite the increase in demand for sports supplements (in particular, based on whey protein), studies on the consumer demand in this area have been insufficient [15].

Conducting a survey is one of the most important tasks in studying the consumer market. In order to obtain information on the demand for protein cookies with a high protein content, an online survey (questionnaire) of preferences for snack foods was conducted among visitors to fitness clubs in the city, students and other interested respondents. As the survey showed, this type of study was extremely interesting not only for people leading a healthy lifestyle - visitors to fitness clubs, but also for students.

Why conducting a survey? This method has the following advantages:

- High efficiency of receiving information.
- The possibility of conducting mass research.
- The relatively low complexity of the procedures for preparing and conducting research, as well as processing the results.

- The lack of influence of the interviewer and his/her behavior on the respondents.
- The researcher's lack of expression of subjective addiction to any of the respondents.

However, survey is also characterized by significant disadvantages:

- Lack of personal contact does not allow to change the order and wording of questions depending on the answers or behavior of respondents.
- The reliability of such "self-reports" is not always sufficient, the results are influenced by the unconscious attitudes and motives of the respondents.

The questionnaire used in a survey has a strict structure and includes several elements: introduction, the main and final parts. A brief description of the main parts of the questionnaire is presented in Fig. 1.

The questionnaire must necessarily contain information about the purpose and objectives of the study, the rules for filling out the questionnaire should be very clear to the respondent. The questionnaire should not contain controversial questions, so as not to cause difficulties during the survey. The anonymity of the questionnaire must be guaranteed.

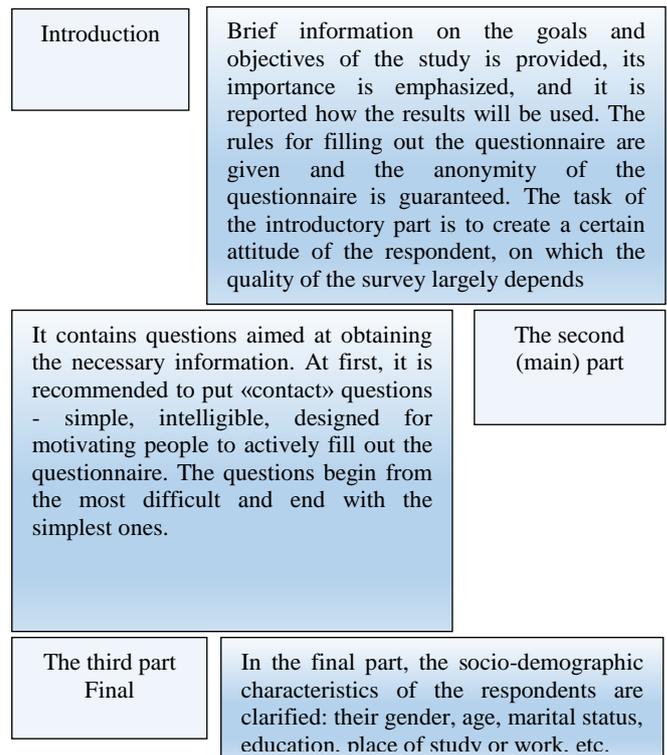


Fig. 1. The questionnaire structure

Here are some results of an online survey. A total of 108 people with a healthy lifestyle took part in the survey - 40 men and 68 women (Fig. 2).

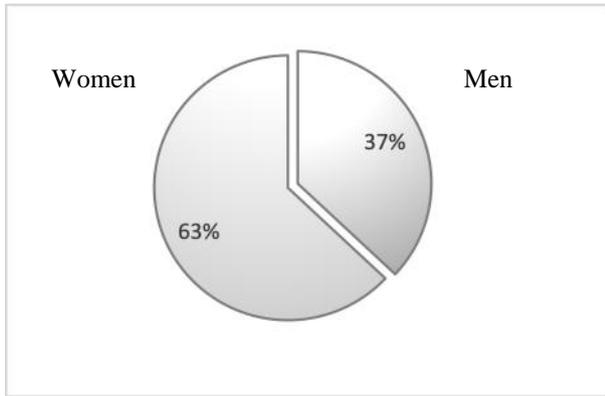


Fig. 2. Gender distribution of the sample

Students, interested respondents, visitors to fitness clubs participated in the survey, therefore, their age category varies. As we see, in fig. 3, the majority of the respondents are people from 20 to 30 years old (58 %) and from 30 to 40 (36 %).

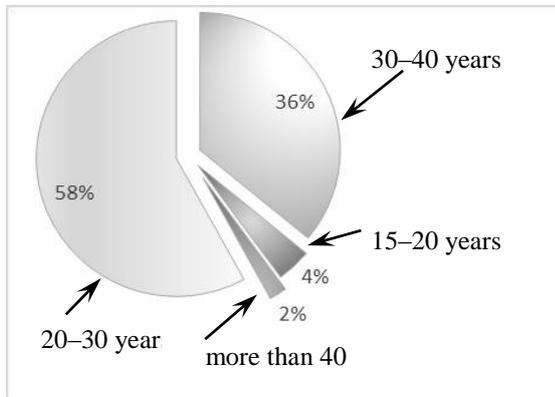


Fig. 3. Age distribution of respondents

In order to determine the approximate ratio of the number of respondents involved in sports (in particular, fitness) we asked a separate question the responses on which are described in Fig. 4.

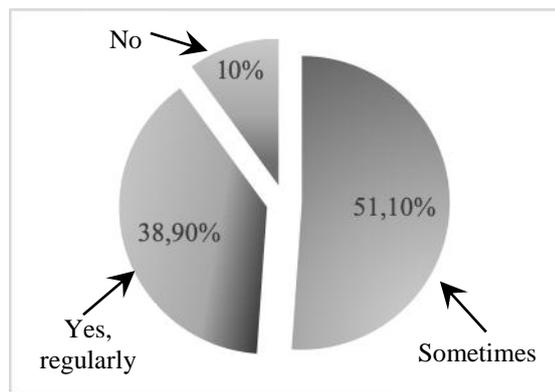


Fig. 4. Question «Do you play sports (fitness)?»

Then the following question was asked - "Do you buy products enriched with useful components?". The survey results are shown in Fig. 5: 70 % answered yes and only 30 % answered negatively.

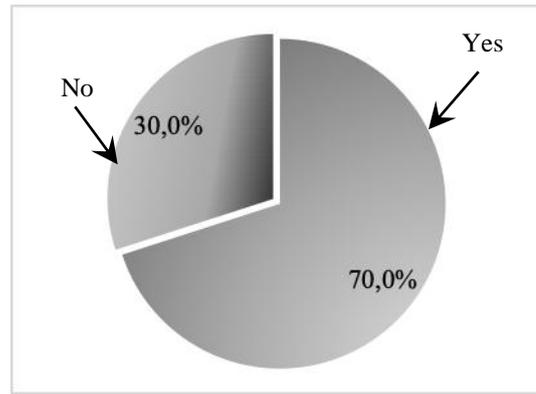


Fig. 5. Question «Do you buy products enriched with healthy ingredients?»

At the same time, to the question "Do you monitor the amount of protein in your diet?" the majority of respondents answered negatively (66.7 %) and only 33.3 % gave a positive answer (Fig. 6). According to the results of the survey, 74.4 % of respondents believe that the use of protein cookies increases working capacity and facilitates exercise tolerance, while 72.2 % of respondents believe that regular consumption of protein cookies with a high protein content helps to build muscle.

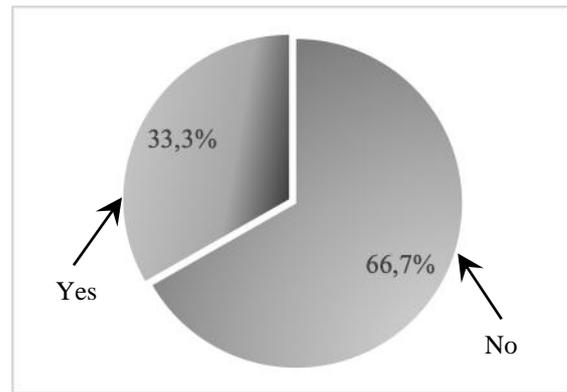


Fig. 6. Question «Do you monitor the amount of protein in your diet?»

And finally, the main question "How often are you ready to buy protein cookies?" - is presented in Fig. 7. It is established that the developed food product - protein biscuits with a high protein content - will be in demand in the consumer food market, especially in the sports nutrition segment, as most respondents are ready to buy this product: 51.1 % of respondents - several times a month; 12.2 % of respondents - 2-3 times a week; daily - 7.8 % of respondents and only 28.9 % of respondents - very rarely.

IV. RESULTS AND DISCUSSION

A similar study to identify consumer demand for protein supplements, their combination with other components, as well as the popularity of diet food among visitors to sports clubs involved in strength training, is given in [9]. It proves that protein products are popular, and with the promotion of a healthy lifestyle, their demand will grow rapidly.

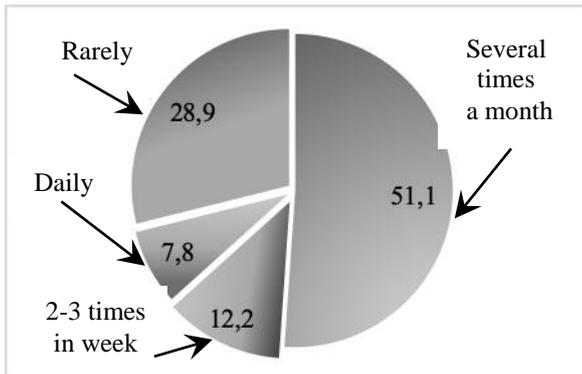


Fig. 7. Question «How often are you ready to buy protein cookies?»

The authors of [15] in their sociological studies found that demographic indicators (gender, income) did not significantly affect the choice of additives. Similar results were obtained by our team.

Thus, analyzing the results of the survey, it is possible to conclude that protein biscuits with a high protein content have positive prospects for consumer demand, but also formulate the goal of the work - to develop a scientifically-based recipe for biscuits with a high protein content. It is assumed that this type of cookie will be intended for a quick meal under limited-time conditions, for example, before training in fitness clubs.

To develop high protein protein biscuits, it is necessary to solve the following problems:

- Identify the source of an additional protein.
- To study the features of the composition and properties of the protein source.
- Develop protein biscuit recipes using additives.
- To analyze the quality indicators of protein cookies with a protein supplement and compare it with a control sample.

To determine the source component of protein, several types of protein were compared using a combination of biological properties and absorption rate, since the initial task was to develop a protein biscuit with increased absorption (Figure 1). The comparison showed that whey has the maximum advantages (Figure 8, component 1). Therefore, it was decided to use whey protein concentrate as an additive component. This protein is relatively inexpensive, mixes well with other components, has high amino acid composition.

The content of proteins, fats and carbohydrates in whey protein concentrate depends primarily on the source of the product from which the concentrate is obtained. It can be whey - a secondary product in the technology of making cottage cheese, cheese or milk casein.

The qualitative composition of the concentrate (and, first of all, the quantitative characteristics of the amino acid composition) also depends on the brand of the product and the country of manufacture. Figure 9 shows data on the content of proteins, fats and carbs in 100 g of whey protein concentrate.

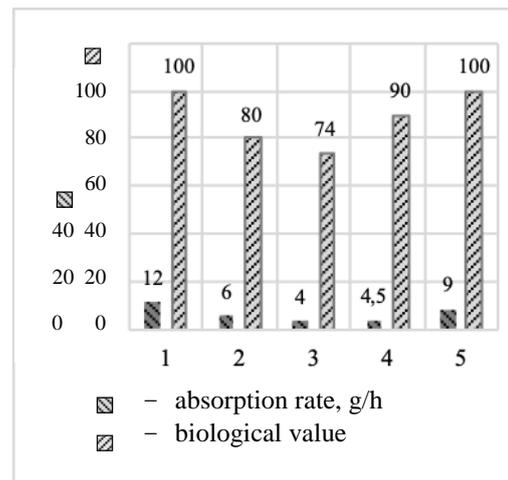


Fig. 8. Biological value and protein absorption rate: 1 – whey protein; 2 – casein; 3 – soy protein; 4 – milk protein; 5 – egg white

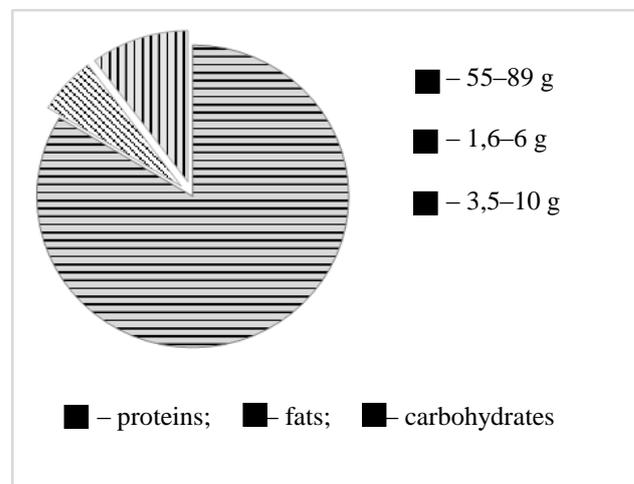


Fig. 9. The content of proteins, fats and carbohydrates

After analyzing all the data (the amino acid composition of whey protein concentrate, the content of fats, proteins and carbs in it, the absorption rate, etc.), and most importantly - the results of online testing, the second stage of work was performed, namely, a protein cookie recipe with a high protein content was developed.

V. CONCLUSION

Currently, protein cookies are sold in sports nutrition stores. Before starting to develop a new technology for its production, it was necessary to conduct research on the consumer demand, which showed a positive consumer trend. Having these data, the second part of the work (not the subject of discussion in this article) was completed - the recipe of protein cookies with a high protein content was developed. As a component, a whey protein concentrate was used, the content of which varied depending on the recipe. Partial replacement of one (or several) ingredients with a protein component made it possible to obtain a product with exactly those characteristics and properties that were planned, which was confirmed by the studies.

Thus, a product with a high protein content was obtained, which will be sold in sports and fitness clubs and which can be consumed in conditions of limited time before or after

training (initial task). Protein cookies can also be baked in cafeterias, cafes, and will certainly be popular, as an increasing number of people in our country choose a healthy lifestyle.

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