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Nutritional and biological value of new pasta enriched with soy protein isolate

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The relevance of the topic. The nutritional value of food is one of the most important factors determining the health of the population. One of the reasons for the increase in morbidity and mortality is the insufficient intake of full-fledged proteins, vitamins, macro- and microelements with food.

The purpose of this work is, together with technologists, to develop pasta of increased nutritional and biological value with the addition of soy isolate and intended for sale in the retail network and for the catering network.

Materials and methods of research. The research material was pasta with soy isolate enrichment and pasta without soy isolate enrichment. Physicochemical, organoleptic, and microbiological studies were used.

Keywords: soy protein isolate, pasta, nutritional value.

Research results

According to WHO, more than 60% of humanity does not get enough protein. The lack of proteins in the diet disrupts the dynamic balance of metabolic processes involving proteins, shifting it towards the predominance of the breakdown of the cell's own proteins, and leads to depletion of the body. In this regard, the issues of providing the population with protein components of nutrition are of particular importance, as well as the priority of research in this direction, confirmed by the development and implementation of special programs in industrialized countries of the world [1,2,3,4,5].

To increase the production of meat products, maintain and stabilize the quality of the product, along with the main raw materials, various protein supplements of plant origin are used, which in their properties are close to muscle proteins. Soy is a unique plant with a high content of biologically active and highly nutritious protein. Whole soybeans are distinguished by a significant content of high-quality protein, fats, carbohydrates, fiber, polyunsaturated fatty acids, minerals and vitamins of groups B, D, E. In addition, the composition of beans includes biologically active substances: phytosterols, flavonoids, saponins. (6,7,8,9). Soy products have important therapeutic and prophylactic properties, they have an antitumor, anti-sclerotic effect on the human body, stimulate the cardiovascular system, lower blood cholesterol levels, contain few calories, and are recommended for people with diabetes. Due to these properties, soybean products are widely used in the technology of special products for dietary and preventive nutrition [1, 2]. The generally accepted mechanism for eliminating protein deficiency and improving the nutritional value of food products is the use of new sources of protein [2,3]. Soy protein is well absorbed by

the body and, in terms of biological value, approaches proteins of animal origin, equivalent in composition to animal protein. Soy protein isolates and concentrates are complete, high quality proteins that are highly digestible compared to animal proteins (casein). In fact, soy protein can serve as an important source of protein for both adults and children. While protein makes up 20 to 30% by weight of most legumes, it makes up roughly 35 to 38% by weight of soybeans. The amount of protein varies in different soy products: soy flour contains 50% protein, soy concentrate contains 70% protein, and soy isolates contain 90% protein. To date, in many countries of the world, soy industrial production has developed that produces textured protein, as well as other soy products (butter, milk, pasta, margarine, ice cream, chocolate, etc.) [11,]. At the same time, phytosterols, isoflavins, genistein, a protease inhibitor, lecithin, and allergens were isolated from soybeans and studied in detail [4,5,11,12].

The purpose of this work is, together with technologists, the development of pasta products of increased nutritional and biological value with the addition of soy protein isolate, intended for sale in the distribution network and for the public catering network.

Materials and research methods.

The material of the study was pasta enriched with soy protein isolate. The studies were carried out at the Department of Hygiene for Children, Adolescents and Nutritional Hygiene of the Tashkent Medical Academy, as well as in the laboratory of the Central State Sanitary and Epidemiological Service of Samarkand. The control was pasta without soy isolate enrichment, which is widely used by the population. Technological instruction for the production of soy protein isolate «ALFA SOY 001" - TI 24179156-001:2019. Employees of YUNUSJON LLC AHLI.

Physical and chemical indicators and organoleptic evaluation of pasta were studied according to GOST: 9404; 27668; 27494; 20239.

Research results

Pasta products are produced in accordance with the requirements of GOST 31743-2017 according to the recipe, subject to the technological regimes of production and compliance with sanitary norms and rules approved in the prescribed manner. Pasta is divided into group A (pasta made from durum wheat flour for pasta) and into varieties: superior, first and second; groups B and C - to the highest and first. For pasta made using additional raw materials, the designation of the group and variety of pasta is supplemented with the name of the same name with additional raw materials.

To enrich pasta with soy protein isolate, we studied the nutritional value of soy protein isolate (SBP). In table. 1 outlines the main ingredients of the nutritional value of NIB.

Table 1.

Nutritional value of soy isolate compared to 1st grade wheat flour

Sample name	Content, %			
	squirrels	fats	carbohydrates	Ash
Wheat flour 1 grade	10.6+ 0.05	1.2 +0.02	73.6+ 0.72	0.7+0.01
Soy protein isolate	65.8+0.52	0.55+0.01	traces	13.8+0.09

From Table. 1 shows that PBI contains a significantly higher amount of protein compared to wheat flour of the 1st grade ($P < 0.001$). Based on the data obtained, it was found that physicochemical and organoleptic studies did not reveal significant differences between PBI and wheat flour of the 1st grade, with the exception of a significantly higher protein content in PBI ($P < 0.001$) and a lower level (traces) of starch, which was associated with defatted soy flakes.

In the developed pasta, depending on the method of molding, they were divided into cut, pressed and stamped. Also subdivided into the following types: tubular, filiform, tape and curly. These all types of pasta are divided into long and short.

Long pasta can be single or double bent, as well as shaped into skeins, bows and nests. The mass and dimensions of long pasta formed into coils, bows and nests are not limited.

In the manufacture of pasta, the following main raw materials were used:

- durum wheat flour for pasta according to GOST 31463 ;
- soft wheat flour for pasta according to GOST 31491 ;
- Wheat flour according to regulatory documents in force on the territory of the

Republic of Uzbekistan.

In the manufacture of pasta, the following additional raw materials are also used:

- food chicken eggs in accordance with GOST 31654 ;
- egg products according to GOST 31464 , GOST 30363 ;
- dried vegetables according to GOST 32065 .
- soy protein isolate according to Ts 24179156-001:2019;

Table 2.

Recipe for new pasta enriched with soy protein isolate

No.	name of raw materials	For loading in kind
on	Wheat flour I or premium	100,0 кг
2	soy protein isolate	5.0 kg _
3	Drinking water	12,0 л
fo	Eggs for food	35 pcs

In table. 3 presents the results of organoleptic indicators of pasta. The organoleptic properties of pasta enriched with soy protein isolate do not differ from pasta without protein enrichment.

Table 3.

Organoleptic characteristics of pasta with enrichment of soy isolate and pasta without enrichment of soy protein isolate

Name of indicator	Soy Protein Isolate Enriched Pasta	Pasta without soy protein isolate
Smell Color	Corresponding to the type of flour. The color of products using additional raw materials varies depending on the type of this raw material.	Same

Taste	Inherent to this product, without foreign taste	Same
Smell	Inherent to this product, without foreign smell without foreign tastes, not sour, not bitter	
The content of mineral impurities	When chewing flour should not feel a crunch	Same

Thus, organoleptic studies did not reveal significant differences between pasta with enrichment of soy protein isolate from pasta without enrichment of soy protein isolate.

physical and chemical indicators

According to physical and chemical indicators, pasta must meet the requirements specified in table 3.

Table 4

Name of indicator	Norm						
	Group A			Group B		Group B	
	Top grade	First grade	Second grade	Top grade	First grade	Top grade	First grade
Humidity of products, %, no more*	13±0.09	13±0.09	13±0.09	13±0.09	13±0.09	13±0.09	13±0.09
Acidity of products, hail, not more than: - tomato - others	10±0.067 4±0.03	- 4±0.03	- 5±0.034	10±0.067 4±0.03	- 4±0.03	10±0.067 4±0.03	- 4±0.03
Mass fraction of protein in terms of dry matter, %, not less than	10.5±0.7	10.5±0.7	10.5±0.7	-	-	-	-
Ash, insoluble in 10% HCl solution, %, max	0.2±0.007	0.2±0.007	0.2±0.007	0.2±0.007	0.2±0.007	0.2±0.007	0.2±0.007

Mass fraction of ash in terms of dry matter, %, no more	0.90±0.01	1.20±0.014	1.90±0.02	0.60±0.01	0.75±0.01	0.56±0.01	0.75±0.01
vegetable, egg	1.40	1.70	2.40	1.10	1.25	1.10	1.25
The content of flour from soft wheat, %, no more	15±0.98	15±0.98	15±0.98	-	-	-	-
Dry matter transferred to cooking water, %, no more for small format and filiform with a diameter of up to 1 mm	6.0- 9.0						
Shape retention of welded products, %, not less than	100						
Metal-magnetic impurity, mg per 1 kg of product, no more	3 when the size of individual particles is not more than 0.3 mm in the largest linear dimension						
The presence of infestation and contamination by pests of grain stocks	Not allowed						

The content of toxic elements, mycotoxins, pesticides, radionuclides and microbiological indicators did not exceed the permissible levels provided for in the "Special Technical Regulations on the Safety of Bakery and Pasta Products" and SanPiN RUz 0366-19 "Hygienic Standards for Food Safety".

Table 5

Chemical composition of pasta with and without enrichment of soy protein isolate

Sample name	Content, %			
	squirrels	fats	Carbohydrates	Ash
Soy Protein Isolate Enriched Pasta	13.6+0.037	1.5+0.028	75.6+0.019	0.7+0.009
Pasta without soy protein isolate fortification	7.0+1.04	1.3+0.02	76.1±0.017	10.8+0.036

The energy value 100 g of the finished product is 371 kcal.

It should be noted that pasta enriched with soy protein isolate contains protein 13.6 + 0.03, compared with pasta without enrichment with soy protein isolate, 6.6% higher than pasta without enrichment with soy protein isolate.

Thus, based on the data obtained, a technological instruction for the production of pasta using owl protein isolate - TI: 16-06 -2022.10.12 was developed together with technologists. approved by the Department of Sanitary and Epidemiological Welfare and Public Health of the Samarkand region .

CONCLUSIONS:

1. Organoleptic studies did not reveal significant differences between pasta enriched with soy protein isolate and pasta without enrichment with soy protein isolate.

2. Physicochemical and microbiological parameters of pasta enriched with soy protein isolate comply with the requirements of the GOST standard.

3. Pasta enriched with soy protein isolate contains protein 13.6 + 0.04, compared with pasta without enrichment with soy protein isolate, 6.6% higher than pasta without enrichment with soy protein isolate.

4. For pasta enriched with soy protein isolate, technological instructions TI have been developed: 16-06 -2022.10.12 .

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