

Improving and determining the nutritional technology of minor fish products

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Abstract. The work provides basic information about the functional properties of fish culinary products developed on the basis of fresh pike perch and catfish with the addition of powders of plant origin: Jerusalem artichoke flour. Suggestions and recommendations are given for determining the nutritional value of minced fish products by improving the technology for preparing fish cutlets. The effect of herbal supplements from Jerusalem artichoke on the functional and technological characteristics of minced fish cutlets. The nutritional value, amino acid composition of finished products prepared on the basis of fish raw materials with the addition of Jerusalem artichoke powder, flavoring additives and vegetable raw materials were studied. Developments have been developed to introduce new specialized dietary products enriched with high-quality natural food additives. The list of ingredients with immunomodulatory and antioxidant properties and the possibility of their use in the preparation of specialized fish culinary products for rational and specialized nutrition are substantiated.

1 Introduction

Half-finished and highly finished products are one of the main areas of the fish industry, such as production of canned food and sandborne products. This allows us to use the raw materials raw materials due to the width of the range of products. For example, semi-finished and products from large fish can be made of small or mechanically injured fish - cursement or pasty products. Half-finished and highly finished products are produced by fish processing enterprises, saves labor, and the opportunity to comprehensive mechanization of production. The volume of labor in the preparation of catering in food and housing products in this regard is multiplied by several times [1-3].

Little fish in fisheries, as well as traditional technology to develop fishing culprings for the quality indicators of the quality indicators of quality indicators. The fish is semi-finished and high finished products using methods of industrial machincinity to fish processing enterprises. In most of these industrial enterprises, there are uninterrupted and complex - mechanized lines for the production of finished products in the wide range of

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products. The range of products prepared in these complexes is first semi-finished and high-finished products [4-5].

Although the nutritional value, dietary and treatment-prophylactic properties of fish and fish products are high, there are some problems in the food market of our republic. This problem is caused not only by the material and technical equipment of the fish industry, the specific conditions of fish farming and the distance between fish transportation, but also the processing of small fish species, fish that do not meet standard requirements and damaged fish, secondary products of processed fish on the basis of zero-waste or low-waste technology. also related to putting. In fish processing enterprises, big mistakes are made in terms of the consistency of finished products. Fish muscle tissues undergo deep autolysis (hardening first, then maturation process). In this process, the consistency of the fish tissue first softens and then hardens [5-6]. In such a state of muscle tissue, moisture easily passes through the tissue - the ability to retain moisture decreases. Traditional processing of these raw materials - salting or smoking under the influence of heat (kipper) is difficult, in some cases completely impossible. In the production of new types of fish products, it is also necessary to take into account that the autolysis process is different in different fish. Currently, new types of fish products with certain organoleptic, physico-chemical and nutritional properties are used in order to improve the consistency (hardness, viscosity, elasticity, brittleness, softness) of vitamins, unsaturated fatty acids, mineral salts, amino acids and other types of additives. practical work is being done by industry experts. These works must be economically efficient and the quality of the product should be up to date [7].

However, it can be concluded from the analysis of the literature that with the development of civilization in developed countries at the present time, as a result of the mechanization and automation of aging workers in many fields, the reduction of physical labor, the effect of ecology, the addition of various preservatives to food products to extend their shelf life, the increase in blood pressure, and heart rate , colon cancer and other diseases are on the rise [8, 12].

It is well established by scientists that the consumption of especially high-calorie, refined food products is the cause of obesity and the above-mentioned diseases. in the treatment of widespread diabetes and as a prophylactic measure, we used Jerusalem artichoke root, which contains fructose sugar and 16-18% inulin, as an addition to the composition of minced fish products [9-11].

2 Materials and methods

In order to determine the optimal temperature for drying Jerusalem artichoke powder, we made a paste of washed Jerusalem artichoke in a meat grinder for drying at home. In order not to lose the nutrients in the composition, we dried it in a drying cabinet at 70-80 0 C for 230 minutes and put it in polyethylene bags.

We cut the washed Jerusalem artichoke into thin slices and dried it at a temperature of 75 0 C for another drying method. However, it was difficult and time-consuming to grind dried Jerusalem artichoke leaves to a powder state in a laboratory mill due to the hardness of the leaves.

For this reason, it is advisable to first make Jerusalem artichoke puree and then dry it. To determine the amount of Jerusalem artichoke powder used as an additive, it was determined that the moisture content of Jerusalem artichoke powder was 18% before using it.

As an experimental object, we conducted experiments to replace a certain amount of fish mince indicated in the recipe with artichoke powder for preparation of Moynoqcha fish cutlet No. 114 in the collection of methods of preparation of national dishes and culinary

products of the peoples of Uzbekistan, published by Order No. 288 of the Minister of Trade of the Republic of Uzbekistan [8, 12].

As a result of the experiments, when replacing 10% of fish mince with Jerusalem artichoke powder, the natural taste of the product was preserved and it was found to be appropriate, but when 15, 20% of fish mince was replaced with Jerusalem artichoke mince, there was a slight difference in taste and consistency.

As a result of the tasting, the experimental sample with 10% Jerusalem artichoke powder was almost not different from the control sample prepared by the traditional method without adding powder and was highly evaluated. The finished product is appreciated for its delicate taste, Jerusalem artichoke powder is juicy due to its high water absorption properties, and it does not harden quickly during storage.

During the primary treatment of pike, the amount of waste was 47.8%. Weight decreased by 17.8% during heat treatment to prepare highly finished cutlet.

It was almost no different from the results in the set of recipes.

It should also be noted that topnambur powder saves the amount of fish used, lowers the price of the product, and has economic efficiency due to the mechanization of the production process on an industrial scale, as well as the fact that the carbohydrate in it is in the form of fructose, as well as 16-18% inulin and as a source of dietary fiber, diabetes mellitus It has social effectiveness as a prophylactic measure in the treatment of diseases and other diseases.

Table 1. Category of Muynak Fish (Control sample).

Name of raw materials	Amount of consumption, g	
	Weight	Net weight
Sudak or som	215 219	103 103
Onion	8	7
Sour cream	5	5
Egg	3/20 pcs	6
Wheat flour	6	6
The amount of semi-finished products	-	125
Vegetable oil for frying	8	8
The amount of ready cutlet	-	100

Skinless and boneless fish is cut into pieces, mixed with onions and passed through a meat grinder twice. Mix sour cream, egg, salt, and ground black pepper to the mince and cook it. Make cutlets from the fish mince, sprinkle with flour, fry in a tray or pan for 8-10 minutes, pour broth or water over them to make the cutlets softer.

Table 2. Muynak Fish CutletCategory Reception(Experimental sample).

Name of raw materials	Amount of consumption, g	
	Weight	Net weight
Sudak	193.5	92.7
Jerusalem artichoke powder	-	10.3
Onion	8	7
Sour cream	5	5
Egg	3/20 pcs	6
Wheat flour	6	6
The amount of semi-finished products	-	125
Vegetable oil for frying	8	8
The amount of ready cutlet	-	100

3 Results and Discussion

In order to determine the quality indicators and nutritional value of the semi-finished product prepared by replacing 10% of pike perch fish cutlet mince with Jerusalem artichoke powder, the dry matter and fat content of the semi-finished product was determined in a laboratory method and compared with the control sample, the fat content of the experimental sample was 6.9, and the control sample was 6.7. The amount of dry matter was found to be 26.5 in the experimental sample and 25.8 in the control sample (Figure 1).

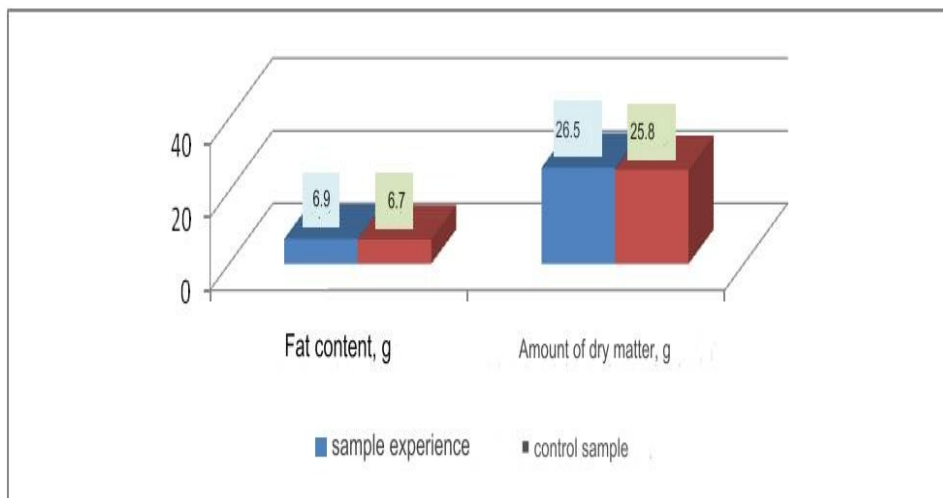


Fig. 1. The amount of fat and dry matter content of semi-finished products of Muynak Fish Cutlet.

In order to fully determine the chemicals contained in the experimental sample and control sample of semi-finished products, the amount of dry matter was determined based on the calculation using the chemical composition of food reference book, when replacing 10% of the fish mince with Jerusalem artichoke powder (experimental sample), the amount of dry matter in the experimental sample was 13. It was found that it increased by 1%, the amount of proteins in the experimental sample was 23.6 g, and in the control sample - 21.5 g, that is, it increased by 9.8%. The amount of fat in the experimental sample was 11.3 g, in the control sample - 9.9 g, and it increased by 14.%. Mono- and disaccharides were 9.7 g in the experimental sample, and increased by 0.93 g, i.e. 8.77 g, in the control sample. So, Jerusalem artichoke is rich in mono- and disaccharides. If the amount of starch is 4% more in the experimental sample, due to the abundance of Jerusalem artichoke, the experimental sample is 10 g in the cutlet semi-finished product, and in the control sample it is increased by 0.06 g, i.e. 9.94 g. Organic acids also increased by 67% in the experimental sample.

However, it was found that the amount of ash in the experimental sample is 7% less than that of the control sample. When determining the mineral content of Moynokcha fish cutlet, it was found that sodium (Na) trace element in the experimental sample is 4.4% less than the control sample. However, it was found that the quantity of the remaining trace elements is high in the experimental sample. It is known from the table that potassium (K) trace element increased by 158%, calcium (Ca) by 44%, magnesium (Mg) by 50%, iron (Fe) by 163% in the experimental sample. Phosphorus element was found to be the same amount in both samples - 215 g. The energy value of the cutlet of the experimental sample was 241 kcal, and the control sample was 226 kcal.

Table 3. The chemical composition of the fish cutlet (Experimental example).

Products	Net weight, g	Dry matter, g	Proteins, g	Fats, g	Carbohydrates		Klechatka	Organic acid	Ash	Mineral substances, mg%						Vitamins, mg%					Energy value, kcal
					Mono-, di-saccharide	starch				No	K	Ca	Mg	P	Fe	β-carotene	B ₁	B ₂	PP	C	
Sudak	93	19.3	17.1	1	-	-	-	-	1.2	79.5	201	25	20	180.4	1.4	0.001	0.074	0.102	0.93	2.79	78
Jerusalem artichoke powder	10/49	6.1	3.92	0.54	8.8	0.2	9.97	0.1	-	4	429	19.6	17	20	3.4	0.023	0.023	0.025	0.51	5.48	24
Onion	7	0.48	1	-	0.63	0.01	0.05	0.01	-	1.3	12	2.2	1	4.1	0.06	0.3	0.004	0.001	0.01	0.7	2.9
Sour cream	5	1.37	0.14	1	0.16	-	-	0.04	0.07	1.75	5.45	4.3	4	3	0.01	0.001	0.002	0.006	0.003	-	35
Egg	6	1.56	0.76	0.69	0.04	-	-	-	0.03	8.04	8.4	3.3	0.72	0.01	0.15	0.003	0.004	0.03	0.01	-	9.4
Wheat flour	6	5.16	0.64	0.07	0.1	4.03	0.01	0.126	0.07	0.72	10.6	1.44	2.64	0.9	0.126	-	0.015	0.005	0.132	-	20
Vegetable oil	8	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71.9
Total :		34.5	23.6	11.3	9.7	4.2	10	0.3	1.4	89	666	56	56	215	5	0.039	0.124	0.169	1.597	9.97	241 kcal

Table 4. The chemical composition of the fish cutlet (Control sample).

Products	Net weight, g	Dry matter, g	Proteins, g	Fats, g	Carbohydrates		Klechatka	Organic acid	Ash	Mineral substances, mg%						Vitamins, mg%					Energy value, kcal
					Mono-, di-saccharide	starch				No	K	Ca	Mg	P	Fe	β-carotene	B ₁	B ₂	PP	C	
Sudak	103	21.4	19	1.13	-	-	-	-	1.33	81.4	222	28	21.6	200	1.54	-	0.082	0.11	1.03	3.09	87
Onion	7	0.98	1	-	0.63	0.01	0.05	0.01	0.07	1.3	12	2.2	1	4.1	0.06	0.3	0.004	0.001	0.01	0.7	2.9
Sour cream	5	1.37	0.14	1	0.16	-	-	0.04	0.03	1.75	5.45	4.3	4	3	0.01	0.001	0.002	0.006	0.005	-	35
Egg	6	1.56	0.76	0.69	0.04	-	-	-	0.07	8.04	8.4	3.3	0.72	0.01	0.15	0.003	0.004	0.03	0.01	-	9.4
Wheat flour	6	5.16	0.64	0.07	0.1	4.03	0.01	0.126	-	0.72	10.6	1.44	2.64	0.9	0.126	-	0.015	0.005	0.132	-	20
Vegetable oil	8	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71.9
Control sample		30.5	21.5	9.9	0.93	4.04	0.06	0.18	1.51	93	258	39	30	215	1.9	0.013	0.107	0.152	1.187	3.79	26 kcal

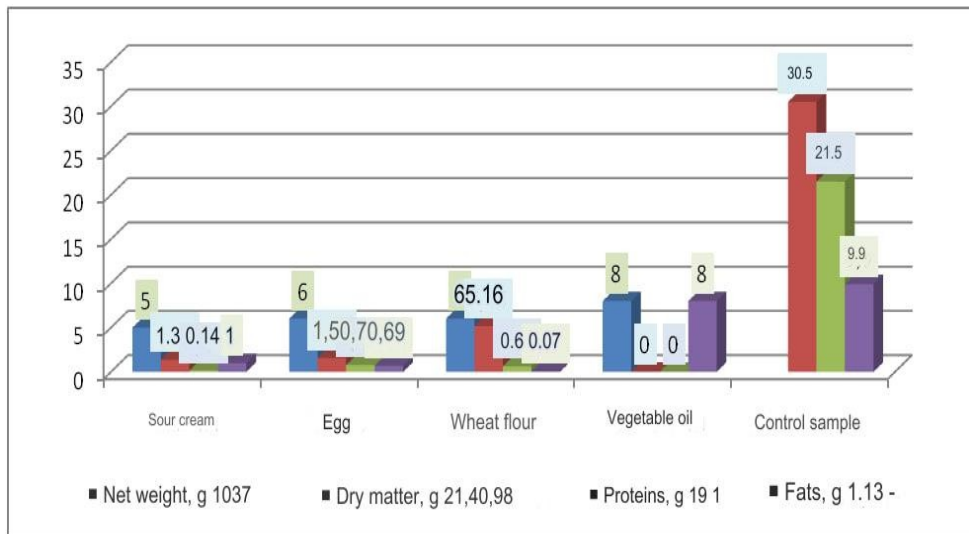


Fig. 2. The amount of products in the chemical composition of the Muynak Fish Cutlet.

So, when 10% of the fish mince is replaced with Jerusalem artichoke powder, its composition includes all chemical elements, except for ash and sodium trace elements, especially carbohydrates (due to the fructose contained in Jerusalem artichoke), dietary fiber (fiber), iron, tin and trace elements, vitamin C, PP and it was found to be rich in other nutrients.

So, using Jerusalem artichoke powder as a food additive to fish mince is known to enrich its nutritional content along with the organoleptic indicators of the product. 8 amino acids - isoleucine, leucine, lysine, methionine, phenylalanine, tryptophan, threonine and valine - cannot be formed in the body from other amino acids and therefore enter the body with food products. Without these amino acids, growth and development in the body stops.

It should also be noted that excessive consumption of proteins is harmful, as uric acid accumulates in the body and its salts increase pain in the joints, turn into fat in the body, and cause obesity.

According to the scientific literature, the ratio of meat and vegetable proteins should be on average 55:45 depending on the type of vegetable products, and 50:50 for meat and buckwheat.

Not eating enough meat proteins causes a decrease in the amount of non-exchangeable amino acids in the body, and as a result, especially in children, memory loss, stunted growth, etc.

The biological value of proteins in food products is determined by different methods. One of these methods is determined by comparing the content of essential amino acids in the product with the content of essential amino acids in the "Ideal" protein.

Chicken eggs, cow's milk or mother's milk are recommended as "ideal". Currently, most researchers use the theoretical protein recommended by FAO and WHO as "Ideal". 1 gram of this protein contains the following amount of essential amino acids (in mg).[8]

Isoleucine	40
Leucine	70
Lysine	55
Methy nin + cystine	3 5
Threonine	40
Tryptophan	10
Phenylalanine + tyrosine	60
Valine	50
Total:	360

To determine the chemical "score" of the product, first of all, it is determined which amino acid is present in 1 gram of the protein of this product. Then, the amount of essential amino acids in the product is compared with the standard scale of FAO and WHO. The chemical "Score" of each essential amino acid in the "ideal" protein is taken as 100%. Any essential amino acid in the product protein is limited compared to the "ideal" protein. To determine the amount of amino acids in the semi-finished fish cutlet product and the chemical "Score", we used the chemical and amino acid composition of food products, volume II spravochnik book. When replacing 10% of the fish mince in Moyncha fish cutlet with Jerusalem artichoke powder, the amount of non-exchangeable amino acids is less compared to the control sample. differed in amount. However, the amino acid threonine was present in a small amount in the experimental sample.

Comparing the chemical "Score" of semi-finished products, the chemical "Score" of valine amino acid was 108% in the experimental sample and 106% in the control sample. Isoleucine in both experimental and control samples - 128%, leucine in experimental sample - 108, in control sample - 109%, lysine in experimental sample - 153, in control sample - 155%, methionine + cystine in experimental sample - 123, in control sample - 114%, threonine in experiment it was found that in the sample - 110, in the control sample - 108%, phenylalanine + threosine in the experimental sample - 113, in the control sample - 137%

Table 5. Amino acids composition and chemicals "Skor" of Muynak Fish Cutlet (Experimental example).

Indicators	Digestible content of the chewable part							100 grams of protein		Chemical "Skor", %
	Sudak	Jerusalem artichoke powder	Onion	Sour cream	Egg	Wheat flour	Total:	Ideal	determiner	
Product weight	93	10/49	7	5	6	6				
Amount of proteins	17	1	0.09	0.1	0.8	0.6	19.6			
Essential amino acids	6622	353	20	48.5	315	198	7557			
Valin	907	59.8	1.8	7.7	46.3	30.6	1053	50	54	108
Isolate	872	42	2.8	7	36	31.8	992	40	51	128
Leucine	1300	68.7	3.5	10.6	65	49	1446	70	74	108
Lysine	1506	66.2	4.2	8.5	54	16	1655	55	84	153
Metho nin+cystine	737	24	1.6	4.1	43	24	834	35	43	123
Threonine	736	47.5	2.8	5	37	19	847	40	43	108
Tryptophan	171	13.7	1.4	1.7	12	7.2	207	10	11	110
Phenylalanine + tyrosine	1096	92	5	11.2	68	52.8	1326	60	68	113

Table 6. Amino acids composition and chemicals "Skor" of Muynak Fish Cutlet (Control sample).

Indicators	Digestible content of the chewable part						100 grams of protein		Chemical "Skor" , %
	Sudak	Onion	Sour cream	Egg	Wheat flour	Total:	Ideal	determiner	
Product weight	103	7	5	6	6				
Protein content	19	0.09	0.1	0.8	0.6	20.6			
Essential amino acids	7334	20	48.5	315	198	7916			
Valin	1004	1.8	7.7	46.3	30.6	1090	50	53	106
Isolate	966	2.8	7	36	31.8	1044	40	51	128
Leucine	1440	3.5	10.6	65	49	1568	70	76	109
Lysine	1668	4.2	8.5	54	16	1751	55	85	155
Metho nin+cystine	744	1.6	4.1	43	24	817	35	40	114
Threonine	815	2.8	5	37	19	879	40	43	108
Tryptophan	190	1.4	1.7	12	7.2	212	10	10	100
Phenylalanine + tyrosine	1557	5	11.2	68	52.8	1694	60	82	137

4 Conclusion

So, experimental and control samples were almost no difference, compared the amount of uncut non-exchangeable amino acids in protein and the "skor" in protein.

When replacing 10% of the minuce of fish is replaced by the Kasinmbu powder, especially in the calculation of ashes and sodium micronex (Flubsala), vitamin C, PP, and other nutrients found to be enriched with substances

Muynak Fish Cutlet semi-finished product exchange is a full value when replacing the surface of the surface of the surface of the sample 10% of the sample powder and the presence of non-exchangeable amino acids and balanced condition.

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