Proecting of functional structure of fish product

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Abstract. The article touches upon the issue of the increasing way of fish products nutrition, the provision of a normal course of exchange processes in an organism and fish production with various micronutrients additives. Fish products enrich a compounding with proteins, vitamins and mineral substances, and also significantly reduce caloric content. Compounding creation is to partly replace a white bread by bran linen and replace the water by turnip adding. This allows enriching the product with food fibers, micro and macrocells and vitamins. The bran linen samples (10, 20 and 30 \%) were investigated for optimum present of vegetable raw materials determination. The samples were made to determinate the optimum functional and organoleptic characteristics of semi-finished products. Prepared experimental samples of combined fish cutlets with vegetable raw materials addition and control sample "fish cutlets" were tested for quality according to physical-chemical and organoleptic indices. That indicates their biological value and quality. Content investigation of such extremely scarce amino acids as a lysine, methionine and tryptophane shows that the fish cutlets «Selyanochka» exceeds a control sample only on amino acid of a lysine of 26.7\%, and on the others showed an equal quantity. The same situation is with the content of the amino acids influencing growth process and development (a leucine, an isoleucine and threonine) for 7.7\%; 33.3\% and 42.8\% respectively in comparison with control. The new type of cutlets with functional ingredients has a number of useful properties for a human body and can be recommended for preventive foods.

1. Introduction

A compliance of food structure quality to the human`s health is an important issue in nowadays. The result is the increased importance of functional foodstuff containing a higher body resistance to diseases ingredients, which allow person keeping active lifestyle for a long time.

Traditional fish products do not contain important nutrients satisfying organism requirements, such as some vitamins, microelements, organic acids, the easily acquired carbohydrates, food fibers. Fish products are made of various micronutrients which are to the maximum increase one`s nutrition value and to provide a normal organism exchange processes. Fish products enrich a compounding with proteins, vitamins and mineral substances, and also significantly reduce caloric content.
Insignificant amount of bran linen in dishes increases appetite, intestines secret production, stimulates development of red blood cells and calms a nervous system. Vegetable fibers effectively struggle with dysbacteriosis, serve as a medium for useful intestinal microflora, and adsorb the harmful substances including allergens. The consumption of bran linen promotes recovery from allergic diseases. Progressing on intestines bran linen increase in volume due to liquid and promotes an intestines peristaltics. This effect is used in constipations treatment. Cellulose, bulking up in digestive tract provokes the satiety feeling that allows reducing portions to excess body weight people and struggles with obesity.

Turnip helps in cleaning the organism from slags. Crude turnip contains about 9% of sugars, the increased vitamin C content (is twice more, than in any root crop), B1, B2, B5, PP, provitamin A (especially in yellow turnip), the easily acquired polysaccharides, sterol (the element necessary at atherosclerosis treatment), a rare element glucorafanine, the vegetable analog of a sulforofoan having anticarcinogenic properties.

Turnip contains a rare micro - and macrocells: copper, iron, manganese, zinc, iodine and many others, and sulfur necessary for blood cleaning, and kidneys’ stones dissolution which no one other vegetable contains. A large amount of magnesium helps an organism to accumulate and acquire calcium. Its constituent antibiotic delays some dangerous for a human body fungi development not influencing on colibacillus and staphylococcus. Turnip accelerates a liver activity and biliation preventing gallstones formation. Cellulose activates the intestines vermicular movement and liquidates nutrients stagnation. That promotes cholesterol’ level decrease and an atherosclerosis prevention. A strong antimicrobial substance – lysozyme - prevents of various skin and mucous diseases.

2. Materials and methods
Compounding creation is to partly replace a white bread by bran linen and replace the water by turnip adding. This allows enriching the product with food fibers, micro and macrocells and vitamins. The bran linen samples (10, 20 and 30 %) were investigated for optimum present of vegetable raw materials determination. Higher percentage of ingredients badly affects new product’s organoleptic properties.

The samples were made to determinate the optimum functional and organoleptic characteristics of semi-finished products.

Prepared experimental samples of combined fish cutlets with vegetable raw materials addition and control sample "fish cutlets" were tested for quality according to physical-chemical and organoleptic indices.

Fish semi-finished products, depending on the number of bran flax with seed and turnips, do not significantly change their indicators, but the most optimal is sample No. 2 - with wheat bread replacement by the 20% of flax bran, and with the water replacement by the 20% of turnip, named - "Selyanochka".

Table 1 shows the formula of "Selyanochka" fish cutlets for functional nutrition.

Product characteristics.

Product is an ovate-flat form with the pointed end. Color peculiar to the used raw materials with a grayish shade.

The raw materials and materials applied by production have to meet requirements of the existing specifications and technical documentation.

Raw materials used for functional fish cutlets with vegetable raw materials production:
- meat of fish (GOST P 55503-2013);
- butter (GOST 32261-2013);
- food table salt is not lower than the first grade (GOST 13830-00);
- bran linen with seed (TU 9290-006-58032938-13);
- turnip (GOST 32791-2014).
Table 1. "Selyanochka" fish cutlets formula

| Ingredients                  | Weight, g | gross | net |
|------------------------------|-----------|-------|-----|
| Fish                         | 80        | 80    |     |
| Wheat bread                  | 14        | 14    |     |
| Linen bran with seed         | 4         | 4     |     |
| Water                        | 16        | 16    |     |
| Turnip                       | 12        | 4     |     |
| Butter                       | 2         | 2     |     |
| Weight of semi-finished product | 118    | 118   |     |
| Weight of new cutlets         |           |       | 100 |

3. Results and Discussion
Proteins are the most important and complex nature chemicals, which are a part of the muscular and connecting tissue forming meat of fish. They are constructed of various amino acids, replaceable and irreplaceable. Amino acids provide plastic reserve formation of a human body. They are muscular, connecting, bone, fatty and nervous tissues. Investigation results of amino acids content of in fish cutlets with vegetable raw materials are shown in table 2.

Table 2. Amino-acid structure of fish cutlets for functional food

| Indicators                      | Contents, g/100g |
|---------------------------------|------------------|
|                                  | Control          | «Selyanochka»    |
| Essential amino acids, including valine | 0,9              | 1,2              |
| Isoleucine                      | 0,9              | 1,2              |
| Leucine                         | 1,3              | 1,4              |
| Lysine                          | 1,5              | 1,9              |
| Methionine                      | 0,5              | 0,5              |
| Threonine                       | 0,7              | 1,0              |
| Tryptophane                     | 0,1              | 0,1              |
| Phenylalanine                   | 0,6              | 0,7              |

Table 2 illustrates that the amino acids content in fish cutlets «Selyanochka» is higher than in a control sample. That indicates their biological value and quality. Content investigation of such extremely scarce amino acids as a lysine, methionine and tryptophane shows the fish cutlets «Selyanochka» exceeds a control sample only on amino acid of a lysine of 26.7%, and on the others showed an equal quantity. And on the content of the amino acids influencing growth process and development (a leucine, an isoleucine and threonine) for 7.7%; 33.3% and 42.8% respectively in comparison with control.

The satisfaction of daily norm for nutrients of fish cutlets «Selyanochka» in comparison with fish cutlets is provided in table 3.

Table 3 illustrates at addition in cutlets from fish of bran linen with a seed and turnips (with replacement with bran linen with a seed of 20% of norm of an investment of white bread; with replacement with turnip of 20% of norm of water investment) in comparison with control the satisfaction of daily need for proteins increases by 4.3% and food fibers for 4.2%; in potassium for 88.4%, phosphorus for 7.33%, magnesium for 3.6%, vitamins: B1 for 6.7%, in vitamin C for 5.64%.
Table 3. Satisfaction of daily norm for nutrients

| Food value                  | Daily norm, g | Fish cutlets Control sample | Fish cutlets «Selyanochka» |
|-----------------------------|---------------|----------------------------|----------------------------|
|                             |               | 100 content g | Percent of daily norm,% | 100 content g | Percent of daily norm,% |
| Carbohydrates, g            | 261           | 15            | 5,75                      | 12,4           | 4,75                      |
| Proteins, g                 | 54            | 12,6          | 23,3                      | 14,9           | 27,6                      |
| Fat, g                      | 60            | 5,9           | 9,8                       | 3,45           | 5,75                      |
| Food fibers, g              | 10            | 1,2           | 12,0                      | 1,62           | 16,2                      |

Mineral substances

| Sodium                      | 700           | 1588          | 226,8                     | 87,6           | 12,5                      |
| Potassium                   | 600           | 283           | 47,2                      | 813,7          | 135,6                     |
| Calcium                     | 900           | 64            | 7,1                       | 44,04          | 4,89                      |
| Magnesium                   | 200           | 32            | 16,0                      | 39,1           | 19,55                     |
| Phosphorus                  | 800           | 172           | 21,5                      | 230,6          | 28,83                     |
| Fe                          | 12,0          | 1,2           | 10,0                      | 1,146          | 9,55                      |

Vitamins

| A mkg %                     | 500           | 10            | 2,0                       | 8              | 1,6                       |
| B1                          | 0,9           | 0,09          | 10,0                      | 0,15           | 16,7                      |
| B2                          | 1,0           | 0,13          | 13,0                      | 0,11           | 11,0                      |
| PP mg %                     | 11,0          | 1,8           | 16,4                      | 1,84           | 16,7                      |
| C mg %                      | 50,0          | 0,4           | 0,8                       | 3,22           | 6,44                      |

4. Conclusion

The new type of cutlets with functional ingredients has a number of useful properties for a human body and can be recommended for preventive foods.

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