

DESIGN METHODOLOGY OF CANNED MEAT FOR CHILD NUTRITION

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Abstract: *The modern consumer of products for children pays a lot of attention on product composition. It is very important to create a product with a high nutritional value, that's why the recipe for canned meat for child nutrition is developed. The product enrichment is a perspective today. In the production process of products for children it is important to add vegetable and cereal components. Before the recipe designing, it is important to calculate the protein content for all ingredients with the use of special method, which was described by I A Rogov and N N Lipatov. With the use of these calculation method, it is possible to understand and calculate the nutrition value of protein in recipe ingredients. Obtained amino-acid score is used for creation a recipe of product. We can understand what amino-acid is default and how we have to enrich the product. For a special age there are three type of canned meat for child nutrition: homogenized, puree-like and coarsely grouch. It was discussed to create a puree-like canned meat for early-life children.*

Key words: *technology, meat cans, child nutrition, ingredients consistency, safety.*

Introduction. One of the priority goal in food industrial complex is to output qualitative and safety products for child nutrition. The raw materials for child products are different kinds of meat and additional vegetables and cereals in order to obtain the product with the high nutritional value. In early years of life it is important for children to eat food with a high protein content for the full development.

Meat products for children must content the ingredients with all nutrients which are necessary in early life. In order to develop children's diet it is significant to understand amino-acids content in the recipe mixture. In turn, obtaining the necessary

macro- and micronutrients with food is due to chemical composition of meat raw materials.

The production process of canned meat for child nutrition is one of the main aims of food production strategy. This special group of products have a number of safety characteristics. One of the most important is a recipe modeling, in term of ingredients consistency. Every producer must pay attention on the recipe composition, specifically: what meat we use for cans for children, what type of supplementary ingredients we have to add in order to save useful properties of product. And the most important item is a nutrient rich. In order to understand what a nutrition value will be, there are many special methods to calculate protein composition in recipe ingredients.

One of the most commonly used is to calculate the amino-acid score of essential amino-acids. In reliance on the ingredient consistency principle, we can produce a health product with a high nutritional value for children. In order to understand what essential amino-acid is default, we can do a calculation about recipe consistency and what vegetable ingredients will be in canned meat for child nutrition. It is very significant to know the protein content at all the ingredients. Knowing the amino-acids score it is easier to design the recipe of the products with the use of consistency principle of nutrition for children's health.

Aim. The most important nutrition principle is ingredients consistency. In order to understand what components may be added in meat cans for child nutrition for increasing nutrition value, the calculation of amino-acids score is established.

Materials and methods. The study subject is meat canned products for child nutrition. The amino-acid score was calculated with the use of the following method. It is known that the amino-acid score of a protein (AC) is expressed in relation to the essential amino acid (NAC) in the protein to the amount of the same amino-acid in the ideal protein (formula (1)).

$$AS = \frac{g \text{ ES in } 100 \text{ g of protein}}{g \text{ ES in } 100 \text{ g of ideal protein}}, \quad (1)$$

An ideal protein is a protein that composition satisfies the body's daily need for essential amino acids.

The amino acid composition of an ideal protein reflects the content of each of their essential amino acids in 100 g of protein.

Results and discussion. As a vegetable ingredient potato was studied, like a component that forms the consistency of the finished product. It has a number of functional properties: hypoallergenicity, structure formation, content of amino acids, micro- and macroelements, vitamins. The composition of potato is quite diverse, it includes starch, nitrogenous substances, sugars, fiber, fats, titratable acids, pectins, nucleic acids, minerals, vitamins: C, B1, B2, B6, PP, K and carotenoids.

In terms of biological value, potato proteins are superior to the proteins of many cereals. They contain all the amino acids found in plants, including the essential ones: lysine, methionine, threonine, tryptophan, valine, phenylalanine, leucine, isoleucine. At the same time, potatoe also contain many allergens, including those belonging to the profilin family. The main allergens are patatin and tuberin. In addition, the composition contains proteins - inhibitors of cysteine and aspartate proteases and cathepsin D, belonging to the soybean trypsin family. Potato flour and starch usually do not contain

allergens. Potatoes contain up to 25% starch, depending on the variety, growing conditions and other factors.

The composition and functional-technological properties (FTP) of beef are considered as the main raw materials. According to the data obtained, 100 g of beef contains: protein - 22.5 ± 0.3 g, fats - 5.01 ± 0.4 g, carbohydrates - 0.06 ± 0.01 g, water - 72.0 ± 0.2 g.

Table 1. The recipe composition for canned meat for child nutrition

The ingredient	The description
Beef category I	meat with the high content of essential amino-acids
Potato puree	hypoallergenicity, structure formation
Wheat flour	cereal, for the high nutritional value
Cook water	consistency formation

In the study of the protein component of the ingredients, the method for calculating the amino acid score of essential amino acids was applied. The value of the amino acid score of essential amino acids was calculated using the mathematical ratio between the content of an essential amino acid in 100 g of protein to the content of a given amino acid in a reference protein, according to the FAO/WHO scale.

Table 2. The score of essential amino-acids in recipe ingredients

The score, g	FAO/WHO scale, in g per 100 g of protein	Beef of first category	Potato puree	Wheat flour
Valin	3,5	1,51	1,74	1,15
Leucin	6,6	1,13	0,97	1,04
Isoleucin	2,8	1,55	1,53	1,23
Methionine+cysteine	2,5	1,66	0,98	0,71
Phenylalanine+tyrosin	6,3	1,25	1,49	0,79
Lysine	5,8	1,39	1,16	0,38
Triptophan	1,1	1,14	0,56	1,1
Threonine	3,4	1,19	1,42	0,80

Based on the above data, the amino acid score for meat raw materials was calculated using the method described above. The calculation data are shown in Table 1. Thus, it can be concluded that there are no limiting amino acids in beef, the rate of which is less than 1.

Vegetable raw materials are not complete in terms of the content of essential amino acids. According to Table 2, it can be seen that limiting amino acids are present in potato and wheat flour, the score of which is less than 1.

Conclusion. The necessity of recipe designing with the use of amino-acids score calculation is explained by one of the main nutrition principles – ingredients consistency. For early life children it is very important to obtain all the nutrients, specifically proteins.

The most significant in the recipe designing for children is a protein content. The ideal protein must contain all essential amino-acids with the score equal to 1. Such an ingredient is beef in the recipe of canned meat for child nutrition.

For the better food utilization for children, it is used to add vegetable components – potato puree, and cereal ingredient – wheat. These components content not all essential amino acids with the score equal by 1, that's why it is combined with the beef which essential amino-acids are in the sufficient quantity.

In conclusion, it is important to design recipe with the use of calculative methods of composition. The used method of score calculation showed, that in order to create a new product we have to know the protein content of all the ingredients. It is the most famous method to calculate the biological protein value, which is necessary for full child development.

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