

# SPECIALIZED GERODIETETIC PRODUCT ON MEAT BASE FOR OLD AND AGED PEOPLE NUTRITION

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The analysis of scientific publications, patent and publicity materials shows that at present the assortment of specialized nutritional products which belong to the group of gerodietetic ones is rather limited, practically all them are products vegetable- or milk-based. Specialized gerodietetic products meat-based are practically not produced. Such a situation shows that the problem of developing gerodietetic products meat-based for the nutrition of elderly and aged people is rather topical one, deserving the most serious attention of scientists and specialists of meat industry.

In this connection, authors of the present report carried out formalization of special medico-biological requirements to which specialized gerodietetic products must satisfy. This formalization was made on the basis of up-to-date conceptions of gerodietetics, which follow from principles of balanced nutrition developed by academician A.A. Pokrovsky, these principles being developed as applied to metabolism in elderly and aged people in Nutrition Institute and Gerontology Institute of the Russian Academy of Medical Sciences. In a formalized form these requirements as applied to the main macronutrients are as follows:

- the ratio of mass quotas of protein and fat  $\approx 1:0,8$ ;
- the ratio of mass quotas of lysin and sulphur-containing amino acids  $\rightarrow 1$ , lysin score, concerning FAO/WHO standard, having to be changes to decreasing ( $S_{Lys} < 100\%$ ), methionine+cystin score having to be changed to increasing ( $S_{Met+Cys} > 100\%$ );
- the mass quota of tryptophan must be less than 1 g/100g of protein;
- the ratio of mass quotas of saturated, monounsaturated and polyunsaturated fatty acids must correspond to the following series of numbers: 3:6:1, a set of polyunsaturated fatty acids having to contain polyunsaturated fatty acids relating to  $\omega$  3 group;
- the energy value of the finished product must be in the ranges of 600-650 kJ/100g.

In addition, the product must contain thermostabile components which are able to inhibit oxidation processes of lipid membranes in the organism and to stimulate peristalsis, to favour the regulation of cholesterol metabolism, as well as it must possess a high protein digestion under the influence of enzyme systems in digestive tract. For grounding preferable ingredients for designing formulations of specialized gerodietetic products, taking into account the formalized requirement the above-mentioned 83 varieties of protein-, fat-, carbohydrate-containing raw materials of animal and vegetable origin were estimated. This estimation showed that from the position of amino acid composition the following varieties are preferable: from animal raw material - beef of top-quality, beef trimmings, horse-meat, beef jowl, dried bone broth, chicken eggs; from cereals - corn meal, oat flour, ricemeal, millet, buckwheat, porridge oats; from vegetable - carrot, cabbage. Just these varieties of raw materials were used for computer modelling the amino acid composition of protein module of gerodietetic products.

Based on the results of this stage of modelling about 2500 variants of the ratio of ingredients above-mentioned were analyzed. The use of the criterion, proposed by authors on the basis of formalization of special requirements to the protein amino acid composition of gerodietetic products:

$$K = \frac{m_{Met+cys}}{m_{Lys} \cdot m_{Trp}} \quad (1)$$

allowed to choose the preferable formulating composition of a protein module, whose amino acid composition differs to a large extent from FAO/WHO standard, but at the same time meets to the greatest degree the specificity of gerodietetic nutrition. The formulation of a protein module includes the following components: top-quality beef, beef trimmings, oat flour, corn meal, dried bone broth.

In the formula (1) the following signs are accepted:  $K$  - coefficient of amino acid correspondence, fraction of unity;  $\alpha = 1$  - coefficient of proportionality, g/100g of protein;  $m_{Lys}$ ,  $m_{Trp}$ ,  $m_{Met+Cys}$  - mass quotas of lysin, tryptophan, methionin+cystin, g/100g of protein.

For approaching the composition of a product designed to the gerodietetic requirements, concerning the set of fatty acids, computer designing of a balancing fat module was carried out taking into account that ingredients to be included in the formulation of a protein module, such as top-quality beef and beef trimmings, contain a considerable quantity of fat with excessive mass quotas of saturated fatty acids.

The analysis of results computer designing of the fatty acid composition of a fat module showed that the best approach to the gerodietetic requirements was ensured in the case when in its formulation salted pork backbone fat and soy-bean oil, taken in strictly determined proportions, were used, a fat module having to be added to a protein one in the ratio of 0,11:0,89. The calculated fatty acid composition of a gerodietetic product designed corresponding to these conditions is characterized by the following values of fatty acid mass quotas (% to fat): of saturated fatty acids - 35,78; of monounsaturated fatty acids - 52,63; of polyunsaturated fatty acids - 11,59; of linoleic acid - 9,14, of linolenic acid - 2,25 and of arachidonic acid - 0,20.

The final variant of the formulation of gerodietetic product designed (VITASTIMULIN), taking into account the need of salt and spices addition, includes the following components:

Top-quality beef	Soy-bean oil
Beef trimmings	Sodium chloride
Oat flour	Onions
Corn meal	Carrot
Dried bone broth	Black pepper, powdered
Salted pork backbone fat	

Taking into account the individual characteristics of formulation components of VITASTIMULIN, for developing a product, which combines the high degree of readiness, the possibility of use as the only supplier of nutrients, the adequate biological value, good organoleptics and prolonged storage, the scheme of canned pastes manufacture was chosen as a basic technology for its production. Together with traditional technological operations in this scheme additional ones were included connected with the pre-treatment of corn meal, oat flour and dried bone broth for the next preparing the stuffing mix. When grounding conditions of making these operations, it was taken into account that in the process of traditional pre-treatment of non-salted meat raw materials for preparing the stuffing mix, e.g. during cooking, about 25% mass of the broth, into which a great quantity of fat and protein is extracted, is accumulated.

By means of sufficiently simple technological experiments and organoleptic estimation it was established that for the complete use of broth and ensuring the delicate consistency characteristics of paste produced the cooking operation of beef trimmings, top-quality beef and pork backbone fat must be carried out in double quantity of water to their total mass.

Experimental data obtained characterising the complex of qualitative properties of the sterilised specialized gerodietetic product VITASTIMULIN which was manufactured in accordance with the technological scheme developed by authors are given below (Table 1). Clinical trials of paste-like product VITASTIMULIN were carried out at the department of cardio-vascular pathology of Nutrition Institute under the direct guidance of Head Dietitian of Russia, Corresponding Member of the Russian Academy of Medical Sciences Samsonov M.A.

This product was included into the ration of patients at the age of 60-70 every day during 20 days. All the patients without exception estimated taste properties of the product as excellent ones on five-point system. The biochemical analysis showed that as a result of this product consumption the lipid spectrum of blood showed a tendency



which is characteristic for hypolipemic effect with antisclerotic trend: true decreasing of cholesterol content was established, arterial blood pressure became normal. Decreasing of antitrypsin in patients, blood serum observed indicates that dietary therapy with the gerodietetic product developed influenced normally on the enzyme function of pancreas.

As a whole, clinical trials, as specialists of Nutrition Institute concluded, proved promising use of this paste-like product meat-based for nutrition of elderly and aged people.