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Development of Technology for Food for People with Hypersthenic Body Type.

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ABSTRACT

The aim of the study is to develop technology food with preventive properties for people with hypersthenic body type. The authors identified the main components of prescription formulations functional orientation to ensure completion of missing ingredients for this body type. For the development of the composition was used a mixture of plan. To enhance the therapeutic effects were included in the formulation of L-carnitine and the drug "Vitol". As a result of study lipid metabolism, blood glucose, blood hematological parameters found that the inclusion of specially selected foods, for certain purposes, biologically active substances, can be used not only for the prophylaxis but also for the treatment of various diseases.

Keywords: Hypersthenics, L-carnitine, food supplement, functional food.

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INTRODUCTION

Not eating enough protein, vitamins, minerals and dietary fiber leads to various diseases. Copious diet with excess fat, carbohydrate, dietary fiber, and lack of polyunsaturated fatty acids leads to pathological conditions associated with excessive power. Overweight and obesity increase the risk of atherosclerosis, insulin, diabetes, hypertension, diseases of the biliary tract, osteoporosis, certain cancers, and so on. D. Functional foods help to improve the structure of supply and prevention of common diseases of modern man (atherosclerosis, obesity, cancer, osteoporosis, diabetes, and others.) [1].

The purpose of diets for people with hypersthenic body type is to reduce body weight by limiting dietary energy, carbohydrates with a high glycemic index, fat, fluid, salt, and food exciting food center. Total fat intake should not exceed 30% of total calories, saturated animal fat - 10% of cholesterol - 300 mg / day. The degree of reduction in caloric content should be proportional to the degree of excess of normal body weight. Usually when obese calorie diet should be 40% less than the normal needs. Depending on the patient and the effectiveness of treatment this percentage may be reduced to 30% or increased to 50%. Thus it is desirable to take into the energy expenditure in the standard patient exertion.

When building a diet is important to observe possible principle by introducing a balanced diet products containing a sufficient amount of essential amino acids, fatty acids and vitamins.

Analysis of scientific researchers identified the key components of prescription formulations functional orientation, providing ingredients for filling in missing persons hypersthenic body type. Proposed to use the following raw materials: beef, pork lean, beef liver, soy flour, soy concentrate, rice flour, wheat fiber [2]. The proposed formulation components allow the development of a balanced composition of categories of citizens who are obese. The Beef and pork lean sources are animal protein and certain minerals suppliers (sodium, potassium, magnesium, phosphorus, iron, copper, zinc, cobalt and others.) and vitamins. Beef liver is not only rich in animal protein, and salts of iron, vitamin A, B; it contains vitamins E and K. Soy flour and soyprotein concentrate and increase the nutritional value of functional and technological parameters of combination products, enriching them with proteins, vitamins A, B₁, B₂, PP and fat. Rice flour has high taste, easily digestible, is a dietary product, a source of vegetable protein, dietary fiber, vitamins, minerals, capable of regulating the functional and technological properties of the finished product [3].

As a source of dietary fiber is proposed to use the drug "Vitatsel." Thanks to very good moisture-absorbing ability of the drug can be further reduced calorie final product, put it in the category of dietary intended for preventive nutrition.

Of dietary supplements for hypersthenics proposed to use L-carnitine and the drug "Vitol". L-carnitine - biologically active substance belonging to the class of vitamin-like substances, which promotes the transport of free fatty acids through the mitochondrial membrane and their use in cells as an energy source. L-carnitine is one of the most heavily used "fat burners" today [4].

Oil products "Vitol" has cholesterol-lowering properties, is a vegetable phospholipids. Natural phospholipids favorably with those of other drugs lack of adverse side effects and have a tonic effect on the body.

Inasmuch as to correction of the balance of components to be achieved by means of meat-based products. When designing meat products it is very important to the quantitative content Amino Acids (AA) was closer to the standard FAO (g / 100g protein).

METHODS

For the development of the composition used a mixture of plan. The efficacy of the compositions were in the Excel, for each experiment planning matrix to calculated chemical and amino acid composition.

Determining the optimal compositional conducted using established in Annex Pascal, virtual array factor. The slice of array of variables to consisting of 16443, are shown in table 1. For each array experiment using EXCEL to calculated as protein, fat, minerals, vitamins and amino acid composition (Table. 2).

The compounding protein products to optimized amino acid composition (as compared to the standard FAO) and in accordance with the disadvantage of the consumption of certain nutrients (vitamins and minerals). Virtual array and benchmarks (required content in the composition of certain nutrients) were clustering (Fig. 1).

Table 1: The slice of array of variables

No of experiment	The components of the compounding, %						
	The beef	The pork lean	The Vitatsel	The Beef liver	Soy flour	soyprotein concentrate	Rice flour
1	2	3	4	5	6	7	8
1	43,0	48,0	0,9	4,1	2,0	1,0	1,0
2	70,4	7,1	0,0	15,0	2,5	2,5	2,5
....
16443	47,7	38,0	1,6	9,5	0,2	1,0	2,0

Table 2: Chemical composition of model in the factor array

No of experiment	protein, %	fat, %	Mineral content, µg/100g							The content of vitamins, µg/100g						
			Na	K	Ca	P	Fe	Mg	Zn	B ₁	B ₂	B ₃	B ₆	B ₁₂	E	PP
1	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	14,3	12,0	51,0	242,0	7,0	164,0	1,6	21,0	3,0	0,5	0,1	0,5	0,3	2,0	0,5	2,4
2	18,0	3,1	63,1	315,5	8,7	182,5	2	21,3	3,1	0,0	0,1	0,4	0,4	2,5	0,5	4,5
...
16443	16,9	6,5	72,7	248,7	7,3	154,9	1,9	19,4	2,8	0,2	23,9	0,4	9,8	7,7	0,6	3,2

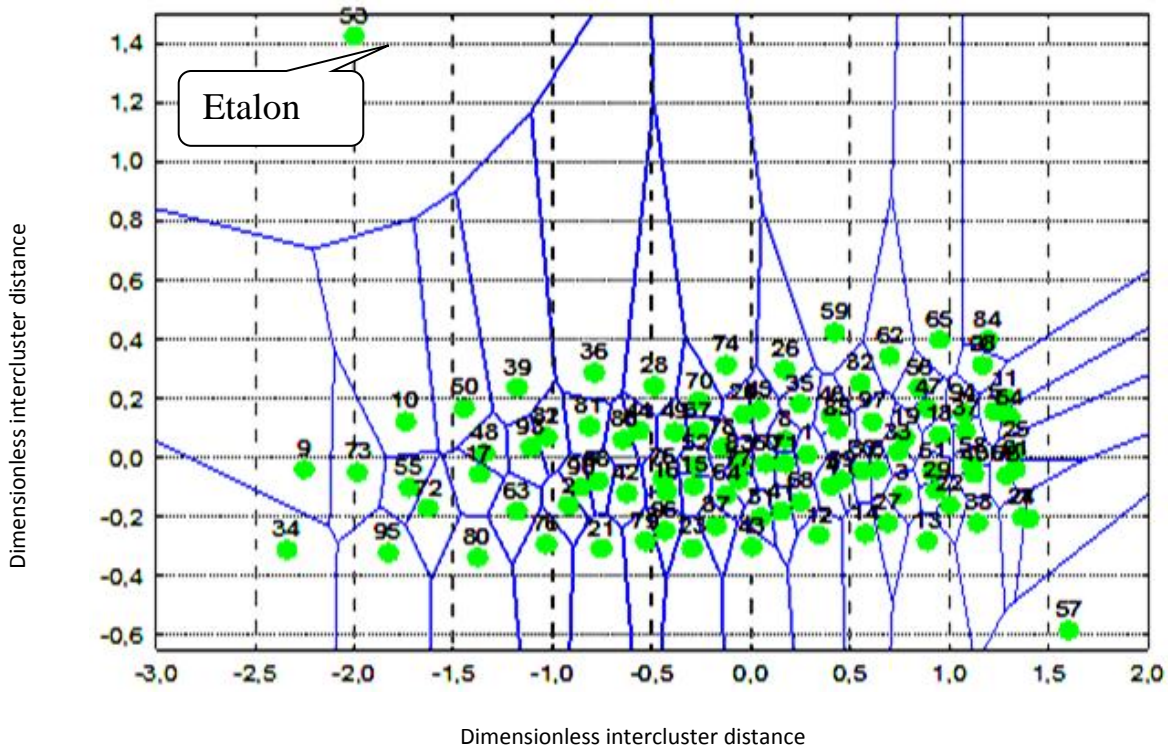


Figure 1: Diagram optimization component composition

MAIN PART

Table 3: Optimal composite compounds

№ of experiment	The components of the compounding, %						
	The beef	The pork lean	The Vitatsel	The Beef liver	Soy flour	soyprotein concentrate	Rice flour
1	55,4	7,0	1,0	27,0	2,5	2,7	4,4
2	65,9	0,7	1,1	26,0	1,0	2,6	2,7
3	54,0	10,4	1,7	25,2	2,7	3,0	3,0
4	61,2	0,2	0,0	29,1	3,1	3,2	3,2
5	64,5	0,0	0,5	27,2	0,0	3,9	4,0
6	55,4	8,9	1,2	27,3	1,9	2,8	2,5
7	52,9	8,5	2,5	27,9	3,5	3,3	1,4
8	53,5	6,9	1,1	26,8	4,2	3,6	3,9
9	57,0	8,6	2,2	25,5	0,8	3,8	1,7
10	54,1	9,6	2,0	27,1	2,6	3,8	0,8
11	59,4	6,7	0,4	27,0	3,6	2,8	0,1
12	59,4	3,7	0,4	26,9	2,8	2,5	4,3
13	55,5	4,2	2,4	27,9	5,2	2,2	3,7
14	45,3	20,4	0,2	25,8	4,3	2,1	1,9
15	56,3	9,8	1,1	26,7	1,9	3,2	1,0

Table 4: Calculation of the balance of the amino acid the compounding of meat compositions

№ of compounding	Amino-acid score limiting amino acid (C _{min}), slice	The coefficient of utility (U), slice	The indicator «redundancy content essential amino acids» (σ _T), g / 100g of protein	The indicator «comparable redundancy content essential amino acids» (σ _C), g	The use of essential amino acids biosynthesis interchangeable, Σ ^{EB} essential amino acids, slice	The use as source of energy material (Σ ^{EW} essential amino acids), slice
1	0,85	0,8352	6,03	7,09	0,0357	0,16477
2	0,85	0,8331	6,07	7,14	0,0363	0,16687
3	0,87	0,8487	6,28	7,18	0,0372	0,15126
4	0,85	0,8415	5,76	6,78	0,0339	0,15846
5	0,85	0,8326	6,14	7,22	0,0364	0,16730
6	0,85	0,8377	5,92	6,96	0,0349	0,16224
7	0,85	0,8376	5,93	6,98	0,0350	0,16233
8	0,87	0,8516	5,66	6,47	0,0363	0,14839
9	0,87	0,8493	5,76	6,58	0,0370	0,15064
10	0,87	0,8543	5,54	6,33	0,0355	0,14560
11	0,87	0,8516	5,66	6,47	0,0363	0,14839
12	0,85	0,8352	6,03	7,09	0,0356	0,16475
13	0,85	0,8400	5,82	6,85	0,0343	0,15996
14	0,87	0,8533	5,59	6,39	0,0358	0,14661
15	0,87	0,8560	5,47	6,25	0,0350	0,14393

Performing clustering virtual array and to compare the results with benchmarks obtained optimal amino acid composition of the compounding (Table. 3).

Analysis of the composition in the studied clusters revealed the most appropriate combination of the rational components.

Using a technique developed dts NN Lipatov, estimated an equation rationality and essential amino acids.

Calculate the rate of utility, performance "comparable redundancy essential amino acids," the use of amino acids in the biosynthesis of essential, and as a source of energy material. Calculation results of the balance of amino acid composition shown in table. 4.

As can be seen of table. 4 ratio of utility (U) is in the range of 0.8326 to 0.8560; the total share of the amino acid biosynthetic precursors (Σ^{BS} essential amino acids) interchangeable, is 0.0339 - 0.0364, the mass fraction of the essential amino acids that are a source of energy material (Σ^{EM} essential amino acids), is equal to 0.14393 - 0.16687. The calculations (table. 4) show a good balance of amino acid composition.

Optimal amino acid composition is a composition number 15, inasmuch as amino-acid score limiting amino acid for this option is 0.87 slice of utility coefficient 0.8560 slice, which is higher than that of other compositions, the rate of redundancy content NAC low - 5.47 g / 100 g protein. A small amount of mass fractions used for the biosynthesis of nonessential (0.0357) amino acids. Number of mass fractions of NAC used as energogenny material is 0.14393.

Development of a compounding of boiled sausages preventive orientation for persons with hypersthenic type of a constitution.

Composition №15 served as the basis for formulating preventative boiled sausages for persons with hypersthenic body type. To enhance the therapeutic effect, taking into the permissible standards of animal protein intake and dietary supplements to included in the formulation of L-carnitine in an amount of 0.1 kg, and preparation "Vitol" - 1.5 kg per 100 kg of the basic raw material. In line with the recipe were produced prototypes and explore their main qualitative characteristics The received results testified to effectively executed optimization of composite structure of a compounding. The prototype had rather high an exit (120,3% to the mass not of salty raw materials) and an average organoleptic assessment (4,8 points).

SPECULATION

For an assessment of biological value of the developed compounding experiments on white mice weighing 20 - 30 g to made. At experimental animals modelled obesity, by increase in caloric content of food, due to introduction to a diet of excess quantity of lipids (pork and mutton fats). For receiving the results showing existence of experimental obesity, animals were broken into 3 experimental groups. Two weeks animals received the forage enriched with fats. Then 2 groups instead of fats were given experimental sausages in proportions, similar on caloric content. The 3rd group throughout all experiment received the forage enriched with fats. The 4th group (control) received a standard diet of a vivarium.

CONCLUSION

As a result of studying of a lipidic exchange, the content of glucose in blood, hematologic indicators of blood is established that inclusion in food specially picked up, for definite purposes, biologically active agents, can serve not only for prevention, but also for treatment of various diseases. The essentialsny phospholipids entering experimental sausage, a L-carnitine, and other components reduce process of obesity and normalize a metabolism, even in an organism with symptoms of obesity.

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