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NEW GENERATION OF CANNED MEAT PRODUCTS BASED ON RATIONAL USE OF TRADITIONAL AND NON-TRADITIONAL KINDS OF RAW MATERIAL

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Background
When developing a new generation of canned meat products, investigations of new components aimed at their introduction into foodsuffs are necessary. Both previously known and recently developed components or those which found new application can be used as components.
During manufacture of a balanced product it is necessary, first of all, to develop the optimum formulation, and in case of choosing one ingredient, for instance, protein, it is possible to select such a ratio that could give a possibility to obtain the product optimum exactly by this component.

Objective
Study of structural-mechanical, chemical and organoleptic properties of soybean proteins, multi-functional and food additives of different firms and development of new technologies of multi-component canned foods based on meat raw material with its partial replacement was the objective of our investigations.
In the process of work, indices of pH, mass moisture fraction, fat, ash, protein, content of aminoacids (common and free), as well as organoleptic, functional properties, microstructural and biological investigations of new kinds of canned foods were studied.
Recently, in connection with acute deficit of animal protein in human nutrition, more and more attention is paid to manufacture of combined meat products based on utilization of animal and vegetable proteins, in particular, soybean proteins.

Objects, Methods, Results and their Discussion
Soybean proteins SUPRO 500 E (firm "Protein Technologies International"), TVP (firm "ABM"), "Soprotex N" (firm "Sojaprotein") were used as an object of investigations.
Preservation of quality and yield of products at the level of traditional ones when using protein components to the same extent depends on their appearance and dose, quality of the used raw material.
It was established, that the optimum percentage of introduction of the vegetable protein component in the hydrated form into the formulation was not more than 30 % from the total mass. The regime and degree of hydratation are determined depending on the kind of the protein used. Chemical characteristics and functional properties of proteins given in Table 1 demonstrate changes of indices under investigation depending on the vegetable protein kind.

Table 1. Chemical characteristics and functional properties of proteins

Indices	SUPRO 500 E	Soybean meal Sojaprotein	Texturate Sojaprotein
Content, %:			
moisture	5.0	7.0	8.0
protein and dry substances*	90.9	49.0	52.0
fat*	0.6	2.0	2.0
ash*	3.8	6.5	6.5
Functional properties, %:			
water-retaining capacity	600.0	580.4	258.0-316.0
cold-hardened gel	16.3-18.5	11.5	7.8
hot-hardened gel	12.3	9.5	5.6
fat-binding capacity	112.1-122.7	148.0	144.0

* - on conversion to absolutely dry substance.

As a result of investigations carried out, a number of formulations and technological regulations of utilization of canned foods with soybean proteins for main kinds (type "Stewed meat", "Paste", "Minced meat") were developed.
The following object of investigations was additive TARI P 80 N of "Guilini" firm, composed of phosphates, sodium nitrite, sodium ascorbinate, gelling agents in the form of carrageenans and modified starches.
Change of water-binding capacity (WBC), pH and degree of penetration of meat model systems are given in Table 2. It is obvious from the table, that water-binding capacity and degree of penetration increase with the increase of the introduced amount of water.

Table 2. Change of WBC, pH and degree of penetration of meat model systems with TARI P 80 N complex food additive

Indices	Model systems with TARI P 80 N					
	28.58 % of water		35 % of water		41 % of water	
	X	S	X	S	X	S
WBC, %	75.3	2.42	77.6	2.31	80.3	2.16
Degree of penetration, un. of degree of penetration	15.0	0.35	15.2	0.47	15.3	0.41
pH	6.3	0.08	6.4	0.09	6.45	0.07

Proceeding from mathematical calculations and considering preliminary experiments, the optimum amount of the additive filled in canned meat, depending on the mass of used raw material and the volume of added moisture, was determined.
By estimated data it was determined, that the optimum ratio should be the following: meat - 63-66%; additive - %; water - 29-32%.

On the basis of the results obtained, the optimum dose of the additive (2 %) and the method of its introduction with preliminary curing in pickle or without pickle were determined, and a number of normative documents for canned meat products with use of TARI P 80 N complex food additive, what contributed to 1.52 times increase of the production output, as compared with the control, were developed. At the same time, by its organoleptic properties the new kind of canned foods practically didn't differ from canned foods manufactured according to GOST.

The next objects of investigations were additives of Hahmulsion type of the "HAHN"company (Germany).

Hahmulsion stabilizers represent systems of food additives (hydrocolloids - thickening agents, emulsifiers, buffer salts, etc.), ensuring stability of different systems and good consistency. Vegetable gums, carbonilmethyl cellulose, propylene glycol alginate, approved for utilization by the European Parliament of food additives, enter into the composition of stabilizing systems.

Stabilizing systems of the "HAHN"company are used for development of emulsions and canned рвтй and minced meat or thick sauces for the first and second courses from canned foods on their basis.

Based on investigations carried out, a number of formulations with utilization of Hahmulsion MSR (for cold cooking) and SBF (for hot cooking) were developed. Percentage of utilization of these additives, which amounts to 3 %, was determined.

The above stabilizing systems of the "HAHN"company are, in our opinion, of particular interest in canned foods which permit to create a new trend in canning production.

In the course of studying the food value of canned foods with utilization of different food additives, aminoacid composition was evaluated and aminoacid score of certain kinds of canned foods was determined in comparison with the control sample (Table 3). In all the samples under investigation isoleucine, threonine and valine were limiting.

Table 3. Aminoacid score by essential aminoacids (in %)

Aminoacid	Stewed beef (control)	Stewed beef special (3 % of SUPRO 500 E)	Stewed beef in jelly "Stolichnaya"(2 % of TARI)	Canned stewed meat "Lubitelskaya"(7.5 % of "Soprotex" texturate)
Isoleucine	86.5	84.25	87.0	92.25
Leucine	93.5	92.1	93.43	101.7
Lysine	136.36	127.6	126.7	133.2
Methionine+cystine	104.29	106.86	104.29	120.3
Phenylalanine+tyrosine	120.7	121.3	121.5	128.7
Threonine	93.25	81.3	87.0	90.5
Valine	83.8	96.2	80.6	83.8

Biological evaluation carried out on new kinds of canned foods of "Stewed meat" type showed, that samples manufactured with utilization of different vegetable proteins, had higher index of protein efficiency coefficient (PEC), as compared with the control sample ("Stewed beef" under GOST 5284-84) and "Stewed beef "Stolichnaya", manufactured with addition of TARI P 80 N (Table 4).

Table 4. Biological value of meat products, M±m

Indices	Samples			
	1 (control)	2	3	4
Consumption of protein, g	13.5±2.1	12.4±2.1	13.2±11.9	13.3±2.2
Growth of body mass, g	42.1±3.9	36.4±3.2	49.2±3.5	44.7±3.5
PEC	3.1±0.2	2.9±0.3	3.7±0.2	3.3±0.3

Conclusion

The developed canned food permit to reduce the cost of the finished product by 20-30 % of the control sample.

Thus, with the aim to increase food and biological value of the finished product, the optimum percentage of introduction of vegetable protein and food additives into canned meat was established, on the basis of which a number of formulations and technological regulations of a new generations of composite canned meat products were developed.