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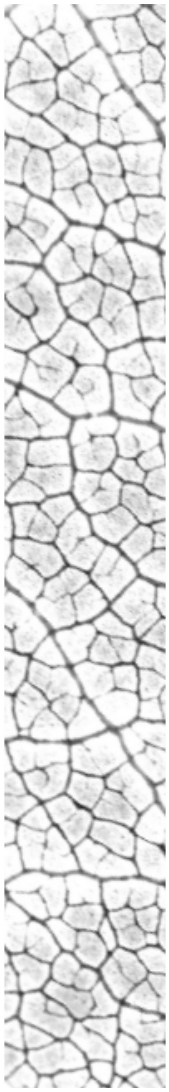

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The methodology of the analysis and synthesis of rational choice recipes of cooking dishes

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Abstract
To offer the food industry the main directions of rational choice of different dishes, the new scientifically-based methodology and development is needed, and to establish which of the main directions or ephemeral, it is impossible - you need a retrospective look at the history of cooking as a whole.
In the development of the methodology of analysis and synthesis of rational choice of recipes used conventional and special methods of analysis and synthesis of recipes, technologies and modes of preparation of various dishes, technological equipment, special cutting tools. Executive bodies, tooling and other elements are related to the technology of food production.
In the analysis and synthesis, an assessment is conducted according to the criteria of rational choice of the layout solution from the arrays of the formed set of recipes for the preparation of recommended dishes.
From the array of new, well-known recipes and their technologies of preparation of various dishes by analysis and synthesis of layout solutions the methodology of rational choice of dishes, allowing for different criteria to establish the best possible choice is proposed.

Keywords: rational choice of dishes, technology of dishes, analysis, synthesis, layout solutions

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INTRODUCTION

It is known that the set of ingredients for the initial products for cooking is determined by the natural resources and material production – livestock, agriculture and a variety of crafts, which causes the formulation of national cuisines for different countries (Mogilny 2011, Nugmanov et al. 2015, Sdobnov and Tsyganenko 2010, Sdobnov et al. 2002, Titova and Nugmanov 2013, Vasyukova 2008).

The national cuisines of the countries bordering the seas and oceans are dominated by fish and seafood dishes, and the cuisines of the countries located in the steppe, forest areas are dishes from the products of agriculture, livestock and forestry, and so on. Mainly all national cuisines of the world use the same raw materials, apply different technologies of mechanical, refrigeration, heat treatments and various technological methods of a peculiar combination and mixing of products and do not involve the preparation of unified dishes, and consumers of such dishes perceive them as completely different dishes, giving them a special unique taste, for example, for products from meat, rice, potatoes and others.

Obviously, we are not talking about the choice of a thousand dishes of two hundred best (tastes do not argue) and not about which of the known to different peoples “rational” cooking techniques are preferred, and which should be discarded.

Some of the recipes of dishes led the food industry to a standstill and themselves become obsolete, while others are still used and that in the evolution of the culinary art of all peoples were both rational and erroneous directions of its development.

Thus, the new scientifically-based methodology and development can offer the food industry the main directions of rational choice of different dishes (Nugmanov et al. 2015, Titova and Nugmanov 2013), and to establish which of the main directions or ephemeral, it is impossible - you need a retrospective look at the history of cooking as a whole.

Among consumer classic dishes particularly pleasant are labostrie meat jellies, entrees and soups fish and cabbage soup from fresh cabbage with neutral or slabokislami broth, with a sweet vegetable thick and delicate fish meat. Therefore, Russian cuisine has long been widely known throughout the world, which is a

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$K=\{k_1,k_2...k_\beta\}$ Technological study of the process of cooking (a)	$T=\{t_1, t_2... t_\alpha\}$ Recipe study of a specific dish of cuisines of the Russian Federation and cuisines of the world by ingredients (b)	$E=\{e_1, e_2...e_\delta\}$ Low-tech combinations of recipes, methods and processing methods that are not allowed for cooking (c)	$F=\{f_1, f_2...f_\varphi\}$ The combination of technological processes that are unacceptable for cooking offered dishes (d)
$R=\{r_1, r_2...r_\sigma\}$ The set of recipes of dishes, methods and methods for cooking (e)	$M=\{m_1,m_2...m_\eta\}$ A set of rational technological processes for cooking (f)	$S=\{s_1, s_2...s_\gamma\}$ The combination of rational (optimal) layout solutions recipes recommended for cooking (g)	

Fig. 1. The main blocks of arrays to the scheme of analysis and synthesis of the choice of a rational set of layout solutions of recipes for cooking:
a and b – an array of technological processes of their preparation and an array of recipe elaboration of dishes; c and d – non-technological combinations of recipes, methods, processing methods, unacceptable for cooking and a combination of technological processes, unacceptable for the preparation of the proposed dishes; e and f – a set of recipes methods and methods for cooking and a set of rational technological processes for cooking; g – a set of rational (optimal) layout solutions recipes recommended for cooking

direct penetration into the international restaurant cuisine of native Russian food (caviar, red fish, sour cream, buckwheat, rye flour and the like) or some of the most famous dishes of the Russian national menu (jelly, soup, pancakes, pies and so on), and in the indirect influence of Russian culinary art on the cuisine of other peoples of the world. The range of Russian cuisine at the turn of XIX and XX centuries has become so diverse, and its influence and popularity in Europe are so great that it started talking about this time with the same respect as the famous French cuisine.

But since in the history of the development of national cuisines of the world there were many different directions, the question naturally arises, what are the criteria for rational (optimal) or not acceptable (wrong) choice in the preparation of various dishes and what should be preferred? How to choose rational (optimal) dishes from an array of different recipes?

The prerequisite for the development of rational options for new and improvement of well-known recipes and technologies for the preparation of various dishes is based on a more complete satisfaction of consumer demand, cooking a variety of specialty and exotic dishes. Specialties of the house include dishes prepared according to a specially developed recipe and technology, taking into account national, regional and other features of the world cuisines.

The development of the methodology of analysis and synthesis allows food enterprises to recommend the choice of rational (optimal) recipes from the set of proposed layout solutions of recipes recommended for cooking at catering establishments of different types and classes.

MATERIALS AND METHODS

As the object of research: reference books of famous recipes, scientific development of recipes of authors and technology of preparation of various dishes, the experience of catering and food production and other sources were used.

In the development of the methodology of analysis and synthesis of rational choice of recipes conventional and special methods of analysis and synthesis of recipes, technologies and modes of preparation of various dishes, technological equipment, special cutting tools, executive bodies, tooling and other elements related to the technology of food production were used (All-Russian classification … 2017, Remnev et al. 2018a, 2018b 2019).

To justify the set of rational (optimal) cho11ice of layout solutions recommended for the preparation of a particular dish, for example, the preparation of the first course – borsch.

The quality of the selected recipe and the technology of its preparation were evaluated according to the following indicators: organoleptic, physico-chemical, provided by GOST (Baturin 2006, GOST R 31986-2012, GOST R 54607.2-2012, GOST 32691-2014).

Mathematical processing of the source data array was carried out with the help of Borland Delphi Enterprise Version 7.0 and Delphi 5.0 software package.

RESULTS AND DISCUSSION

In developing the methodology of analysis and synthesis of the rational choice of recipes for the first and second courses, the authors of the research were based on new and well-known developments of recipes, technology, use of equipment and Executive bodies, ensuring the implementation of any production process for the preparation of specific dishes.

To implement the methodology of analysis and synthesis of rational choice of recipes for various dishes, blocks of arrays were developed (**Fig. 1**) input, input and output data.

With the help of the software, the different blocks of these arrays with the required data (**Fig. 1**) contain the

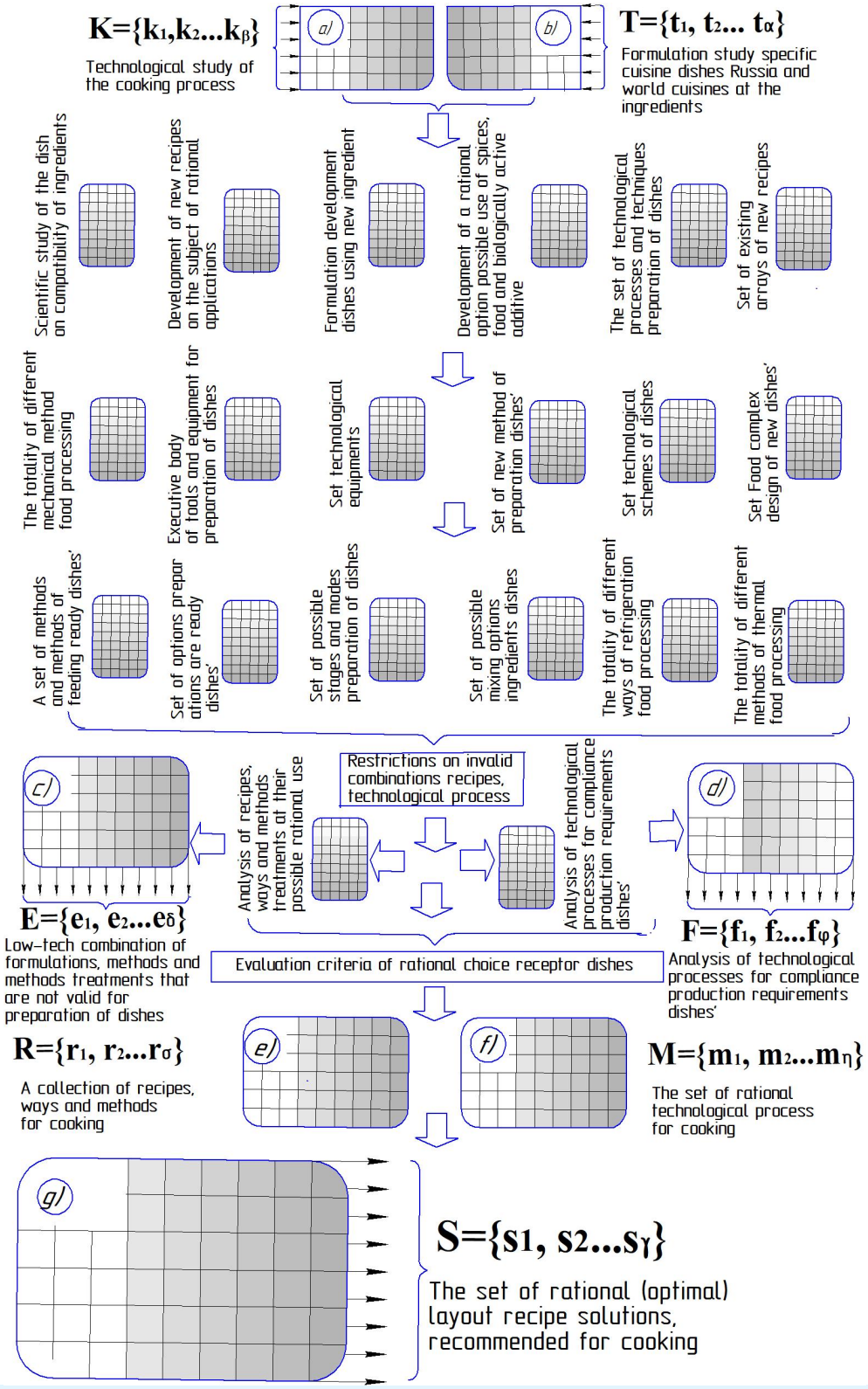

Fig. 2. The scheme of analysis and synthesis of the choice of options for a rational set of layout solutions of recipes for cooking

necessary information for the selection of the required set of rational choice of recipes for specific dishes.

For realization of the question the scheme of analysis and synthesis of rational choice of recipes for the preparation of various dishes is used (**Fig. 2**), the

essence of which consists in the analysis and synthesis of various data sets, and obtaining a set of required rational layout solutions for the selection of recipes.

The proposed scheme of analysis and synthesis of the choice of options for a rational set of layout solutions of recipes for the preparation of various dishes can be, taking into account the development of new recipes, significantly refined and refined. The software also provides for an interactive mode of entering the necessary additional data, and for some populations that do not use the analysis and synthesis process, set temporary access restrictions,

The methodology of choosing a rational variant of technological processes of cooking and a rational set of layout solutions of recipes for cooking is quite a complex and time-consuming task.

To implement the methodology of analysis and synthesis of the choice of a rational set of layout solutions recipes develop software, coding of known recipes, programs and calculation routines for the selection of options for a rational set of layout solutions on a computer, which greatly simplify the search for a set of choice of the required options of dishes.

Number of initial characteristics for different arrays (**Fig. 2**) if necessary, is replenished and clarified, for example, for the first or second courses and others. Moreover, the initial information should be sufficient for their description, analysis, synthesis, evaluation, taking into account the acceptability of ingredients, recipes, cooking techniques, used equipment, tooling and other parameters.

In the analysis and synthesis, an assessment is conducted according to the criteria of rational (optimal) choice of the layout solution formed by the set S for the preparation of specific recommended dishes. As a method of assessing the choice of rational dishes can be taken criteria:

- organoleptic;
- technological;
- economic;
- biological;
- chemical and others.

Analysis and synthesis for sets of initial arrays in the formulation study of a particular dish, for example, for the first dishes and the processes of their preparation (see **Fig. 1**, **Fig. 2**) form an array T with a variety of possible options from specific formulations of ingredients, which in a formalized form can be represented by a set of: $T = \bigcap_{\alpha \epsilon L} t_\alpha$, $L = \{1, 2 \dots \alpha\}$.

In the technological study of the cooking process using different methods of cooking from the set of K, which can be characterized by the formula:

$$K = \bigcap_{\beta \epsilon M} k_\beta, M = \{1, 2 \dots \beta\}.$$

In the analysis and synthesis of the initial sets of arrays T and K, the user of this methodology accepts various restrictions that are unacceptable for some existing recipes in the preparation of specific dishes, as well as technological processes of their preparation (**Fig. 2**), which necessitates the formation of restrictions for the population of F and E, respectively.

Possible scientifically-based restrictions in the analysis and synthesis of recipes of technology of preparation of concrete dishes the user can establish and offer independently, for example, the following restrictions on: - ingredients; - biological and chemical composition; - caloric content of ingredients; - possible combination and mixing; - temperature of performance of technological process of preparation of a dish; - duration of time of performance of technological process of preparation of a dish; - use of processing equipment, working chambers and Executive bodies; - methods and techniques of preparation of semi-finished products and a particular dish (steam, vacuum, pressure, temperature, working environment, impregnation, brine, spices, DIETARY supplements and other additives).

Such a variety of possible options (**Fig. 2**) combination of technological processes F, unacceptable for some existing recipes (due to various reasons of food technology), which in a formalized form can be represented by the formula:

$$F = \bigcap_{\varphi \epsilon Y} f_\varphi, Y = \{1, 2 \dots \varphi\}.$$

Many possible options for non-technological formulations, methods and methods of food processing for combinations of E (**Fig. 2**), unacceptable for the preparation of various recipes of dishes can be written by combination:

$$E = \bigcap_{\beta \epsilon J} e_\beta, J = \{1, 2 \dots \beta\}.$$

An important step for each variant of different arrays of combinations (**Fig. 2**) in the analysis and synthesis of the initial sets of arrays T and K and the study of specific dishes, as well as the processes of their preparation is to obtain arrays M and R for a set of M rational technological processes of cooking and set R for recipes, methods and methods of cooking, respectively.

Then the set of M for the technological processes of cooking determine:

$$M = \bigcap_{\eta \epsilon B} m_\eta, B = \{1, 2 \dots \eta\}.$$

When working out the recipes of specific dishes, as well as the processes of their preparation is to obtain a set of R which is determined by:

$$R = \bigcap_{\sigma \epsilon N} r_\sigma, N = \{1, 2 \dots \sigma\}.$$

Then, the resulting sets of sets T and R are formed:

$$T \cap E = \{\phi\} \text{ and } R \cap E = \{\phi\}.$$

Then the final result of the search for options for rational (optimal) layout solutions of recipes S recommended for the preparation of specific dishes is a set that is determined by:

$$S = \bigcap_{\lambda \epsilon I} s_\lambda, I = \{1, 2 \dots \lambda\}.$$

The formation of a set of layout solutions of recipes S occurs under the condition:

$$S = (T \cap K)(\cup E)(\cup F).$$

The condition for the existence of a set of rational (optimal) layout solutions recipes recommended by catering is the expression:

$$\exists_{\lambda \epsilon I} s_\lambda = [\left(\cap_{\eta \epsilon L} t_\eta\right) \cup \left(\cap_{\mu \epsilon M} k_\mu\right)] \cap [\left(\cap_{\beta \epsilon J} e_\beta\right) \cup \left(\cap_{\varphi \epsilon Y} f_\varphi\right)].$$

CONCLUSION

Thus, after obtaining several options for rational layout solutions for the selection of recipes (set S), the user individually decides on each specific recipe and finally recommends to use them for the preparation of specific first or second courses at catering establishments of different types and classes.

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