An innovative approach to creating a database of the chemical composition and nutritional value of food

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Abstract. The article presents the results of methodological justification of using an innovative approach to create a database of the chemical composition and nutritional value of food products, outlines trends in the quality of nutrition of the population in the context of the provisions and objectives of the National Food Security Doctrine of the Republic of Belarus on 2030. An algorithm and a model for building a database, basic methodological approaches and principles have been developed taking into account the relationship between the assessment of the chemical composition of food products and the sustainable development of the agrocomplex. It is proposed to use a methodology for assessing the chemical composition and nutritional value of food products when creating an in-information-analytical system for monitoring the quality and safety of food products on the domestic market, which ensures the prompt exchange of information between market entities, EAEU member states and third countries, as well as preventing the emergence of relevant barriers to trade and risks.

1. Introduction

In accordance with the main provisions of the Doctrine of National Food Security of the Republic of Belarus until 2030, the strategic goal is to sustainably provide the population with food for adequate nutrition and a healthy lifestyle based on the development of competitive agricultural production and the creation of socio-economic conditions to maintain the consumption of basic food products at a rational level [1, 2]. To ensure monitoring, indicators of the level and quality of nutrition of the population have been determined, including: the energy value of the diet (3400–3500 kcal); consumption of basic food products per capita, kg/year (at the level of 90–110% of the rational norm); the proportion of animal proteins in the diet (at least 55%); the ratio of proteins, fats and carbohydrates in the diet (1.0: 1.2: 4.0) [1].

The nutritional levels of the population are assessed in accordance with international recommendations and are classified into the following groups based on the number of kilocalories per person per day and the structure of the diet. Thus, the calorie content of food at the first level is 2300-2800 kcal per day and is insufficient; the second level of nutrition, corresponding to 2800–3600 kcal,

can be considered sufficient in terms of energy value, but unbalanced in terms of micro- and macroelements; the third level (3000–3500 kcal) corresponds to a diet balanced in energy content and main components; the fourth level (3000–3500 kcal) characterizes a balanced diet, which includes ecological and organic products, improving the health of all groups of the population; the fifth level (3000–3500 kcal), at which the quality of nutrition allows maintaining the health of the population and prolonging active life [3]. At present, the republic has set the task of switching to the fourth and fifth nutrition levels.

In view of the continuous development of food and nutrition approaches at the international and national levels, influenced by research, development and innovation, information services for producers of agricultural raw materials, foodstuffs, consumers and government monitoring and regulation should also be improved. In this regard, we have proposed an innovative methodology for creating a database of chemical composition and nutritional value of food products, which ensures the consolidation of evidence and methodological recommendations.

2. Main part

At the end of 2018, the following trends are observed in the domestic food market of Belarus. The high level of self-sufficiency of the main types of food remains, including: meat – 135.2%; milk – 235.1; eggs – 123.7; potatoes – 106.4; white sugar – 179.4; vegetable oil – 180.6%. Consumption of food products is also at a level close to the rational in terms of volume and structure: in the calculation of the balance method, per capita consumption of meat and meat products per year is 94 kg, milk and dairy products – 247, eggs and egg products – 259 pcs., fish and fish products – 12.8, vegetable oil - 18, sugar – 38.6, bread – 80, potatoes and potato products – 170, vegetables, melons and gourds and products of their processing – 150, fruits, berries and products of their processing – 92 kg (table 1) [4–5]. There is a trend towards a reduction in the consumption of dairy products by the population, the main reason for which is a change in dietary habits, accompanied by the appearance on the market of a large number of substitute products. The results of a sample survey of households, which is conducted by the National Statistical Committee of the Republic of Belarus, indicate that on average for all households for the period 2012–2018 consumption decreased by 24 kg. At the same time, in cities and urban-type settlements, 32 kg more milk and dairy products are consumed per household member than in rural settlements [4, 5, 6]. The consumption of dairy products in families with children is decreasing, which requires appropriate stabilization and stimulation measures [4].

Table 1. Consumption of basic food products per capita, the Republic of Belarus, kg per year.

Basic food products	Year					Growth rate in 2018 in % to 2010
	2010	2015	2016	2017	2018	
Bread	86	86	82	81	80	93.0
Milk and dairy products	247	254	251	249	247	100.0
Meat and meat products	84	89	91	92	94	111.9
Fish and fish products	15.7	13.2	12.3	12.6	12.8	81.5
Vegetable oil	15.9	18.5	18.3	18.1	18.0	113.2
Eggs and egg products, psc.	292	280	264	265	259	88.7
Potatoes and potato products	183	170	171	172	170	92.9
Vegetables, melons and gourds and products of their processing	149	145	146	153	150	100.7
Fruits, berries and products of their processing	65	79	90	89	92	141.5
Sugar	41.1	42.3	38.1	36.8	38.6	93.9

Source: Nat. Stat. Committee of the Rep. of Belarus (2018) *Agriculture of the Republic of Belarus* Minsk, 235 p.

The results of the analysis of the global food security rating 2019, which is compiled by the analytical agency The Economist Intelligence Unit, indicate that the Republic of Belarus is in 36th place out of 113 countries, including 44th place in terms of the level of physical availability of food, economic

affordability – 42nd position, quality and safety of food – 19th position. Food security in the country is ensured by 70.9%.

It should be noted the high achieved indicators of the quality and safety of food in the domestic market, namely: the level of diversification of the diet of the population (the share of non-starchy foods) - 75.9%, the presence of a national strategy for improving the nutrition of the population – 100%, monitoring the quality and safety of food - 100%, a balanced diet for the presence of vitamin A – 100%, iron - 41.4%, zinc - 87.3%, the quality of the diet for the content of animal proteins - 84.3%, the provision of favorable conditions for the consumption of safe food – 100%, the effectiveness of government measures in the field of food safety in the domestic market - 97.5% [7].

Taking into account the indicated and other trends that are revealed in the course of monitoring food security at the national and international levels, systematic work to improve the quality of nutrition of the population should be based on a progressive methodology for assessing the chemical composition and nutritional value of products and effective information support for the activities of market entities. (producers of agricultural raw materials, food products, consumers and the state that monitors and regulates food safety) [4]. Data on the content of basic micro- and macroelements can be used by producers of agricultural products, food products in the process of creating new products, promoting, planning the need for raw materials and ingredients, informing consumers in the field of rational and healthy nutrition.

At the same time, food products must ensure maximum satisfaction of the physiological needs of a person for the necessary nutrients and energy, promote health and meet quality and safety requirements. We used these criteria when developing a database of the chemical composition and nutritional value of food products. In this case, the following factors are additionally taken into account:

- natural and bioclimatic conditions for the production of agricultural raw materials and products (technologies for growing agricultural plants, varieties, properties and quality of soil, agricultural technology and agrochemistry used in crop production; animal nutrition, keeping technologies, organization of veterinary medicine, etc.);
- the influence of processing and storage processes on the chemical composition and consumer properties of food products (data of this kind make it possible to develop waste-free technologies, create ecological food products, reduce the load on the environment and ecosystems, and also form a human diet, balanced in terms of quality and quantitative criteria).

The analysis showed that a comparison of food products from different countries without taking into account the indicated factors can lead to an incorrect result. In this regard, it is proposed to develop and implement national tables of the chemical composition of food products in relation to the conditions of Belarus, which will make it possible to more accurately determine the need for micronutrients and adjust policy measures for fortifying food, develop directions for correcting alimentary-dependent diseases of the population, ensure the introduction of the most objective information on the product label (figure 1).

Based on the analysis of domestic and foreign experience, we substantiated the stages of the formation (filling) of the database, which include: collection, processing and assessment of the quality of primary analytical data; checking the data for compliance with the criteria for the chemical composition and nutritional value of food products; input of objective data into the database in accordance with its structure; aggregation, calculation, evaluation, verification, comparison; data entry; publication of tables in hard copy or electronic form [8].

The following requirements are imposed on the primary data: representativeness and compliance with the structure of product consumption, taking into account national characteristics; availability of a reliable link to the data source and analysis method; compliance with the main sources of nutrients and the group of products (raw, processed, cooked, multicomponent, catering and national cuisine), as well as the country of origin.

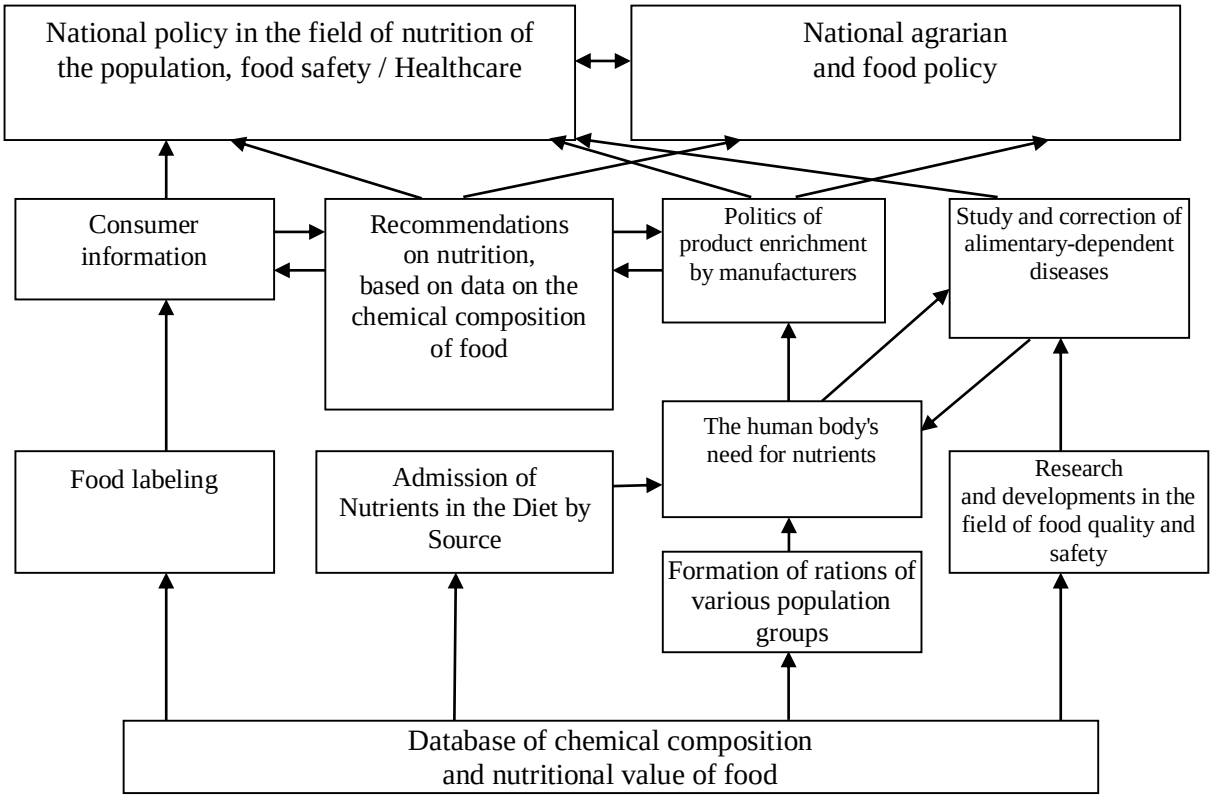

Figure 1. Model of the relationship between the assessment of the chemical composition of food products and the system of ensuring the food security of the population.
Note. Developed by the authors based on their own research.

Taking into account the technological processing, it is advisable to distinguish three categories of products: in the production of which technological processing was not carried out; processing was used that did not significantly affect the content of proteins, fats, carbohydrates, minerals and vitamins (quick freezing, grinding, mixing, short-term cooking, etc.); in the manufacture, processing processes were used that cause noticeable losses of nutrients and nutrients (frying, smoking, etc.).

National tables of chemical composition and nutritional value of products contain the results of assessing the content of the following nutrients (table 2).

Table 2. The list of food nutrients, the content of which is estimated in tables of chemical composition and nutritional value, per 100 g. product.

Conditional abbreviation	Decoding
Water	Mass fraction of water in the edible part of the product, %
Prot	Mass fraction of protein, %
Fat	Mass fraction of fat, %
SFA	Mass fraction of saturated fatty acids, %
PUFA	Mass fraction of polyunsaturated fatty acids,%
Chol	Mass fraction of cholesterol, mg %
MDS	Mass fraction of the sum of mono and disaccharides, %
Starch	Mass fraction of starch,%
Carb	Mass fraction of the sum of digestible carbohydrates, including MDS

	and starch, %
DF	Mass fraction of dietary fiber, %
OA	Mass fraction of organic acids,%
Ash	Mass fraction of ash,%
Na	Mass fraction of sodium, mg %
K	Mass fraction of potassium, mg %
Ca	Mass fraction of calcium, mg %
Mg	Mass fraction of magnesium, mg %
P	Mass fraction of phosphorus, mg %
Fe	Mass fraction of iron, mg %
Cu	Mass fraction of copper, μg %
Se	Mass fraction of selenium, μg %
B	Mass fraction of boron, μg %
A	Mass fraction of retinol, μg %
Car	Mass fraction of ß-carotene, μg %
RE	Mass fraction of retinol equivalent, μg%
TE	Mass fraction of tocopherol equivalent, mg %
B_1	Mass fraction of thiamine, mg%
B_2	Mass fraction of riboflavin, mg %
B_6	Mass fraction of pyrodoxin, mg %
PP	Mass fraction of niacin, mg %
C	Mass fraction of ascorbic acid, mg %
D_3, D_2	Mass fraction of cholecalciferol, ergocalciferol, mg %
EV	Energy value, kcal
Alc	Ethyl alcohol content, % weight

Note. Developed by the authors based on their own research.

Taking into account the current trends in digitalization and automation of food production and circulation processes, covering the entire technological chain "from field to table", it is proposed to form a database of the chemical composition and nutritional value of food products, information that will allow:

• state and public authorities to monitor the quality and safety of food and food security of the population;

• scientists and health care professionals to assess the level and quality of nutrition of certain groups of the population, analyze the impact of diet on the occurrence of non-communicable diseases, and develop appropriate recommendations for prevention;

• for specialists in the field of production, public catering and trade to increase the efficiency of planning production and stocks, improve the food supply of specialized institutions, preschool and school institutions, improve the recommended menus;

• to the population and household members responsible for nutrition, to organize rational and healthy individual meals, etc.

According to international approaches, when developing a national database of the chemical composition and nutritional value of food products, the following methods of obtaining data are distinguished [8]:

• direct - the essence consists in obtaining data through laboratory analysis of food products (provides effective control over sampling and analysis; ensures obtaining reliable data; the disadvantage is cost);

• indirect - based on the use of data from published or unpublished sources (research reports, laboratory research protocols, etc.) (used in conditions of limited analytical resources; is long and expensive;

• combined - it is most preferable when the main food products consumed by the population are analyzed directly, and data for less important products are taken from various sources (including sources from other countries, if necessary).

Based on the analysis, the following criteria for creating a database on the composition of food products were substantiated:

• representativeness, analytical quality and reliability of these tables. The ideal is original insights from well-researched published or unpublished sources. Regardless of whether these data were obtained as a result of analytical studies for the purpose of compiling the base or not, they can be entered into the base unchanged or as an average value;
• maximum coverage of food consumed by the population;
• maximum coverage of nutrients;
• structuredness and unity of data presentation forms;
• transparency and accessibility of the terminology for describing tables and data.

Various groups of food products that are most in demand by the population of the Republic of Belarus have been investigated [10–21]. The obtained data of the chemical composition is analyzed, evaluated, presented in accordance with international criteria and entered into the developed database of the chemical composition of food products. The structure of the information table of the database of the chemical composition of food products is shown in figure 2.

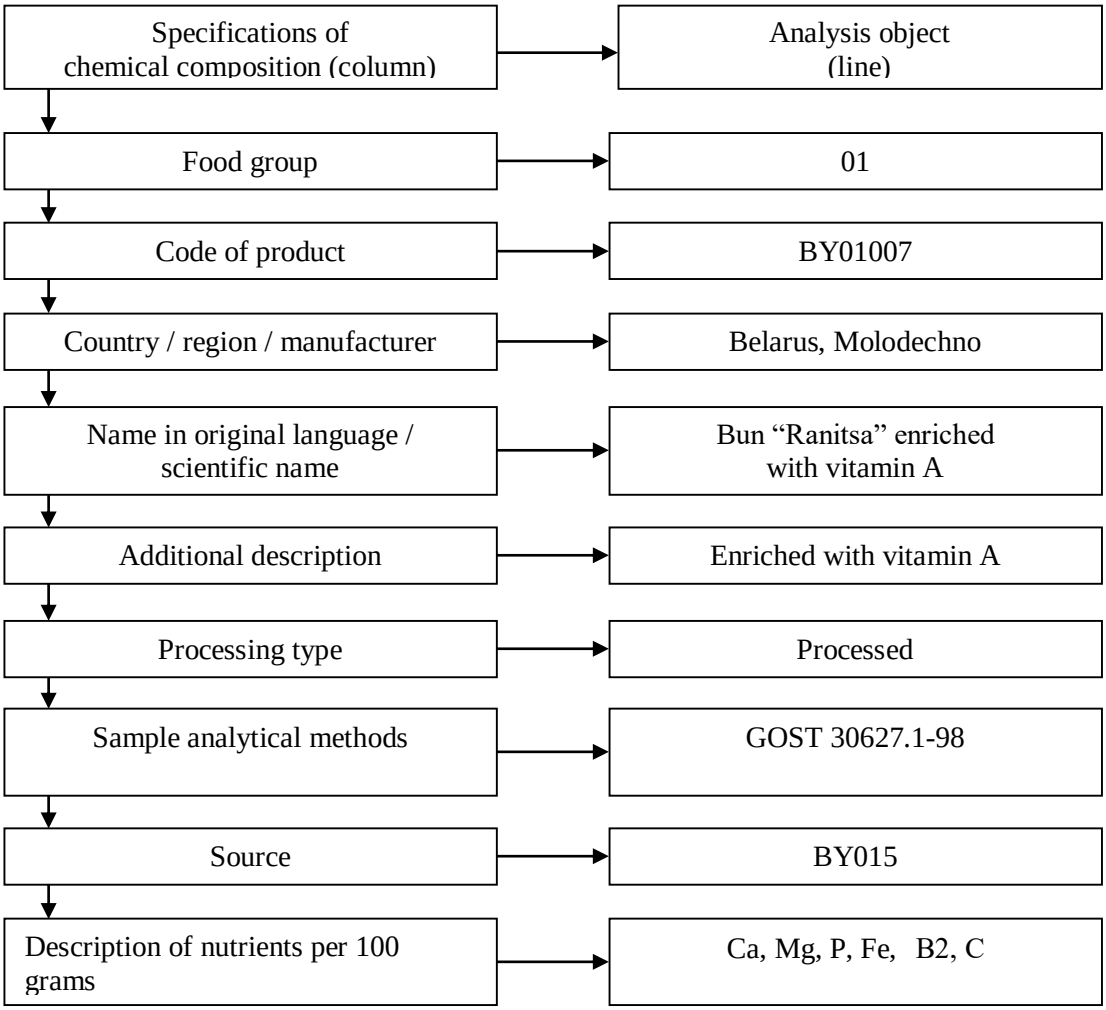

Figure 2. The structure of the information table of the database of the chemical composition of food products.
Note. Developed by the authors based on their own research.

At present in Belarus, when developing new formulations of food products, the results of the analysis of the chemical composition of food products obtained by I.M. Skurikhin more than 30 years ago [22].

Accordingly, changes in the composition of agricultural raw materials and ingredients, agricultural technologies and the content of trace elements in the soil, technologies for processing and storing products are not taken into account.

In this regard, in order to identify and assess the degree of differentiation of the criteria for the content of chemical elements and nutrients in products used in the Republic of Belarus and other countries (taking into account the availability of data), a comparative analysis of the tables of chemical composition and caloric content was carried out (table 3) [23].

Table 3. The results of assessing the actual content of certain mineral elements and vitamins (mg/100 g and % of the chemical composition given in the tables of the Russian Federation).

Table 3.1. Assessment of the content of mineral elements and vitamins in bakery products and vegetables.

Product name	Element																	
	Ca, mg/100g			Mg, mg/100g			P, mg/100g			Fe, mg/100g			B_2, mg/100g			C mg/100g		
	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %
Wheat flour of the highest grade	24	24	0	44	44	0	120	115	4.1	2.1	2.1	0	0.08	0.08	0	-	-	-
Sliced wheat loaf	11.6	19	-39	27	13	52	85	65	23.5	0.9	1.2	-25	0.02	0.03	-33	-	-	-
Sugar cookies	15.4	29	-47	24.3	20	17.6	87.7	90	-2.5	0.8	2.1	-62	0.01	0.05	-80	-	-	-
Oat flakes “Hercules”	56.6	52	8.1	117	129	-9.3	333	328	1.5	4.7	3.6	23	0.07	0.04	43	-	-	-
Buckwheat unground	13.1	20	-34.5	166	200	-17	326	298	8.5	2.6	6.7	-61	0.025	0.03	-16	-	-	-
Potatoes	4.6	10	-54	20	23	-13	49	58	-18.3	0.5	0.9	-44	0.08	0.05	14.3	-	-	-
Table carrots	32.7	51	-35.8	22	38	-42.1	45.1	55	-18	0.4	0.7	-42.8	0.05	0.10	-28.5	-	-	-
Table beet	19.8	37	-46.5	25.8	22	17.2	40.5	43	-5.8	0.68	1.4	-51.4	0.03	0.07	-25	-	-	-
White cabbage	36.3	48	-24.3	18.4	16	16.2	40.6	31	31	0.43	0.6	-28.3	0.04	0.07	0	-	-	-
Cucumbers	23	15.4	49.3	11.1	14	-20.7	30.6	42	-27.1	0.3	0.6	-50	0.02	0.04	-50	3.65	7.0	-48.5
Tomatoes	12.3	14	-12.1	10.8	20	-46	32.1	26	23.5	0.2	0.9	-78	0.05	0.04	25	37.6	25	33.5

Note. Developed by the authors based on their own research.

Table 3.2. Evaluation of the content of mineral elements and vitamins in dairy products.

Product name	Element														
	Ca, mg/100g			Mg, mg/100g			P, mg/100g			Fe, mg/100g			B_2, mg/100g		
	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %
Kefir 2.5% fat	114.5	120	-4.6	8.5	14	-39.3	74.1	90	-17.7	0.04	0.1	-60	0.05	0.17	-70.5
Ryazhenka (fermented baked milk) 2.5% fat	61.6	124	-50.3	9.5	14	-32	64.8	92	-29.6	0.01	0.1	-90	0.068	0.13	-47.7
Sterilized cream	92.7	86	7.2	9.3	10	-7	72.5	73	-0.68	0.14	0.80	-82.5	0.093	0.16	-41.8
Sour cream 20% fat	104.8	58	-44.6	6.5	6	7.6	57.5	59	-2.5	0.01	-	-100	0.091	0.17	-46.4
Ice cream sundae	85.7	100	-14.3	9.6	12	-20	78.7	91	-13.5	0.03	-	-100	0.1	0.28	-64.2

Processed cheese	326.5	610	-46.4	21.1	27	22	566.5	768	-26.2	0.37	0.5	-26	0.33	0.25	24.2
Condensed milk with sugar	307	330	-6.9	-	33	-	-	270	-	0.2	0.33	-39.3	0.3	0.51	41.1
Hard cheese	657	731	-10.1	28.4	29	-2.0	452.5	500	-9.5	0.15	0.30	-50	0.3	0.51	-42
Sterilized cream 10.0% fat	92.7	91	2	9.3	10	-7	72.5	83	-12.6	0.14	0.1	28.5	0.093	0.10	-7
Sour cream 20% fat	104.8	86	17.9	6.5	8	-18.7	57.5	60	-4.1	0.01	0.3	-97	0.091	0.11	-17
Ice cream sundae	85.7	159	-46.1	9.6	21	-54.3	78.7	114	-31	0.03	0.2	-85	0.1	0.21	-52.4
Hard cheese Rossiyskiy 45% fat	657	880	-25.3	28.4	35	-18.8	452.5	500	-9.5	0.15	1	-85	0.30	0.39	-23
Butter 72.6% fat	20.8	24	-13.3	3	0	100	35.4	30	15.2	0.1	0.2	-50	0	0.12	-100
Glazed curd bar with vanilla, 23% fat	28.4	115	-75.3	14.8	39	-62	132.5	186	-28.7	0.14	1.5	-73.3	0.16	0.26	-38
Processed sour milk cheese	326.5	700	-53.3	21.1	33	-36	566.5	700	-19	0.37	0.8	-53.7	0.33	0.07	-78

Note. Developed by the authors based on their own research.

Table 3.3. Assessment of the content of mineral elements and vitamins in meat and fish products.

Product name	Element																	
	Ca, mg/100g			Mg, mg/100g			P, mg/100g			A, mcg/100g			E, mg/100g			B_2, mg/100g		
	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %	fact	[22]	±Δ, %
Pork, hip	5.5	7	-21.4	22.7	24	-5.4	164	164	0	-	-		0.27	0.4	-32.5	0.031	0.14	-78
Pork, boiled hip	7.2	30	-76	19.4	27	-28.1	137	182	-24.7				-	0.4	-100	0.026	0.18	-85.5
Chicken fillet, category 1	5.6	14	-60	22.9	19	17.0	178	160	10.1	25.8	40	-35.5	0.1	0.3	-66.6	0.035	0.15	-76.6
Turkey meat category 1	48.4	12	75	10.5	19	-44.7	166.5	200	-16.5	16.8	10	40.4	-	0.3	-100	0.007	0.22	-96.8
Canned meat "Beef stew"	5.5	14	-60.7	17.3	19	-8.9	137	178	-23.0	-	-	-	-	0.4	-100	0.03	0.15	-80
Beef category 1	6.3	9	-30	21	22	-4.5	150	188	-20.2	-	-	-	-	0.4	-100	0.007	0.15	-95.3
Beef boiled	8.9	30	-70.3	16.4	31	-47.0	116	184	-37	-	-	-	-	0.5	-100	0.003	0.16	-98.1
Rabbit meat fresh	3.8	20	-81	16.5	25	-34	131	190	-31	38	10	73.6	0.5	0.5	0	0.014	0.18	-92.2
Rabbit meat boiled	15.1	44	-65.7	18.2	25	-27.2	116.5	184	-36.6	10.5	10	5.3	0.1	0.5	-80	0.005	0.15	-96.6
Cooked sausage Doctorskaya	22.2	29	-23.4	14.6	22	-33.6	110	178	-38.2	76	10	86.8	0.3	0.3	0	-	0.15	-100
Raw smoked sausage Cervelat	7.2	38	-81	19.4	30	-35.3	137	271	-49.4	16.32	-	100	0.5	0.7	-28.5	0.07	0.03	57.1
Pork, hip part	5.5	7	-21.4	22.7	24	-5.4	164	190	-13.6	-	-	-	0.27	0.4	-32.5	0.031	0.24	-87
Pork, boiled hip	7.2	10	-28	19.4	14	27.8	137	140	-2.1	-	-	-	-	0.4	-100	0.026	0.16	-87.5
Chicken fillet, category 1	5.6	6	-17.8	22.9	26	-4.3	178	160	10.1	25.8	11	57.4	0.1	0.15	-33	0.03	0.18	-83.3
Turkey meat	48.4	4	91.7	10.5	27	-61.1	166.5	230	-27.6	16.8	-	100	-	0.3	-100	0.007	0.15	-95.3
Beef	6.3	5	20.6	21	22	-4.5	150	200	-25	-	-	-	0.4	0.13	67.5	0.007	0.21	-96.6

Raw rabbit meat	3.8	22	-82.7	16.5	25	-34	131	220	-40.4	38		100	0.5	-	100	0.014	0.19	-92.6
Frozen mackerel	23.7	40	-40.7	27.6	50	-44.8	267	280	-4.6	-	10	-100	0.9	1.6	-43.7	0.12	0.36	67
Frozen pollock	38.2	40	-4.5	35.5	55	-35.4	185	240	-22.9	-	10	-100	0.6	0.3	50	0.09	0.11	-18.2
Steamed pollock (steamed)	36.1	47	-23.1	31.2	43	-27.4	188	180	4.2	-	20	-100	0.6	0.3	50	-	0.1	-100
Fresh carp	26.4	35	-24.5	21.3	25	-14.8	183	210	-12.8		20	-100	-	0.5	-60	-	0.13	-100
Blue whiting frozen	116	40	65.5	44	40	9	195	210	-7.1	108	40	63	-	0.4	-50	0.08	0.10	-20
Frozen herring	72.2	60	16.9	40.5	30	26	225	280	-19.6	-	30	-100	-	1.2	-100	0.02	0.30	-93.3
Sprats in oil	293.5	300	-2.1	23.9	55	-56.5	358	350	2.2	35	30	14.2	-	8.8	-100	0.021	0.10	-79
Natural cod liver, sterilized canned fish liver	7.7	35	-78	14.4	50	-71.2	237	230	2.9	8423	4400	47.7	4.9	8.8	-44.5	0.06	0.41	-85
Frozen herring	72.2	60	16.9	40.0	32	20	225	230	2.1	-	44	-100	-	0.76	-100	0.02	0.26	92.3
Sprat in tomato sauce (canned food)	285	250	12.2	25	29	-13.7	186	280	-33.6	36	7	80.5	2.2	2.56	-14.0	-	0.33	-100
Boiled squid	27.5	30	-8.3	55.9	38	32	186	160	13.9	-	-	-	1.8	1.05	42	-	0.38	-100

Note. Developed by the authors based on their own research.

Based on the analysis of the results obtained, a significant difference in the values of the content of mineral elements and vitamins in food products presented on the market of the Republic of Belarus, as well as the data given in the approved tables of the chemical composition and nutritional value of the Russian Federation and Great Britain, was revealed, including:

• in grain and fruit and vegetable products: Ca ± 6.9–21.4%, Mg ± 4.1–18.4%; P ± 1.85–2.3%; Fe ± 9.2–38.1%, vitamin C ± 1.3–6.5%; vitamin B2 ± 7.1-13.2%;

• in dairy products: Ca ± 19.1–27.6%; Mg ± 0.12-18.6%; P ± 10.4-15.2%; Fe ± 62.8–66.3%, vitamin B2 ± 21.5–48.1%;

• in meat products: Ca ± 45; 6.3, Mg ± 22.9%; 13.6%; P ± 24.2%; 16.4%; vitamin A ± 24.6; 42.9; vitamin B2 ± 76.5; 90.4% vitamin E ± 64.3; 16.3 respectively;

• in fish products: Ca ± 11.3; 7; Mg ± 26.9%; 13%; P ± 7.2%; 6%; vitamin A ± 46.9%; 7%; vitamin B2 ± 53.6%; 36.0% vitamin E ± 37.3%; 24.0% respectively.

Thus, the data obtained confirm the relevance, feasibility and necessity of creating national tables of the chemical composition and nutritional value of food products.

The database of the chemical composition and nutritional value of the main food products is posted on the official website of the RUE "Scientific and Practical Center of the National Academy of Sciences of Belarus for Food" (http://www.dev.belproduct.com). The database contains information on the chemical composition of more than 1000 food products (including food groups: flavoring products; grain and its processed products; confectionery; milk and dairy products; meat and meat products; edible fats, fruits, vegetables and mushrooms, their products; fish and fish products, seafood; eggs and egg products) and a wide range of nutrients – 33.

The database management system provides the ability to add or remove chemical composition data by an authorized user. So, upon request, the system administrator registers the user in the system, giving him the appropriate editing rights. After that, the user successfully goes through the authorization procedure on the corresponding page and can make his own edits, which, before entering into the database, will be thoroughly analyzed, evaluated, given in accordance with international criteria and

entered into the database of the chemical composition of food products [24–31].

3. Conclusion

Based on the study, the following conclusions were obtained on the potential of using an innovative approach to create a database of the chemical composition and nutritional value of food:

1. The developed methodology and database of the chemical composition and nutritional value of food products in the future can become an integral part of the information and analytical system for monitoring the quality and safety of food in the domestic market [1–2].

2. In general, further sustainable development of the national food market of the Republic of Belarus provides for the implementation of a number of measures based on innovative support for the activities of the subjects [5, 32–33]:

• creation of an information system for monitoring the quality and safety of food products, ensuring the prompt exchange of information between market entities, the EAEU member states and third countries, as well as anticipating the emergence of relevant trade barriers and risks;

• informing and consulting the population in the field of rational, high-quality and safe nutrition (using a personalized approach, social networks, forums, etc.);

• development of specialized digital platforms for electronic food trade (wholesale and retail), including a mobile application to inform retail buyers about the safety and quality of products on the domestic market, the range of local producers and prices;

• expanding the use of product safety and quality assurance systems by commodity producers in accordance with international traceability standards “from field to table”, as well as the introduction of innovative transparent promotion technologies, etc.

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