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Economic effect of innovative flour-based functional foods production

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Abstract: The article presents the analysis of economic effect for the innovative flour-based functional foods production incorporation**.** Based on the analysis of the current state and prospects for the bakery industry development, the authors propose to expand the range of flour-based foods meant for dietary preventive and dietary therapeutic nutrition using diversification methods. For this, they used alternative recipe ingredients of plant origin, such as amaranth seeds, lentil and lupine seeds, chufa, and carob beans. The innovative technologies improve the chemical composition and consumer characteristics of the foods, provide meeting the market requirements, and increase the efficiency of financial and material resources, which, as a result, facilitates the food competitiveness and leads to the bakery industry effective development. We propose to evaluate the economic effect of innovative foods by determining the retail price and profit with a minimum 10% cost effect. The calculations of economic indicators for traditional and new flour-based foods are presented. Estimated economic efficiency of 1 tonne bakery foods for the standard and high-protein diets (according to therapeutic nutrition diet classification) is 5,030–10,740 rbls, flour confectionary foods – 11,022 rbls, gluten-free breads – 7,625–16,990 rbls, depending on the constituents and bakery technology. The results provide strong evidence of economic effect and the advantages of functional flour-based foods introduction.

Keywords: Bakery industry, innovative technologies, functional flour-based foods, diversification, competitiveness, economic effect

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INTRODUCTION

In the current unsteady market conditions the world experience shows that product diversification is one of the most effective means to stabilize the bakery business, as well as a tool to eliminate imbalances in production and resource redistribution. Diversification is the process of expanding the activity of the enterprise, which uses its own savings not only to maintain and develop the business, but also to direct them to the development of new types of products, the creation of new types of foods, and the provision of all kinds of services [1]. A reasonable choice of diversification techniques provides companies with a real opportunity to strengthen their economic and financial position, to increase product competitiveness, to guarantee companies' efficient performance, and to meet the people's demand for foods; eventually, it will become the pillar of stability in the market and lay the groundwork for companies' further development.

In the bakery industry the same products are being produced for decades. It does not boost companies' development. Every deviation from traditional recipes, as adding one or more ingredients, is considered an innovative solution. Taking into account consumers' requirements and changes in the diet, bakers change the range of bakery products. Despite the fact that local bakery enterprises can offer a wide range of products (over 700), the total volume of novelties does not exceed 5%. Therefore, bakery product diversification through innovative technologies and recipes seems to be a long-term objective. It is important to develop and introduce alternative foods with higher economic effect [2].

In view of diversification and innovative development, brand new strategies for technological

modernization and product-line expansion are needed. The whole technological cycle should be activated: from a scientific innovative idea to the commercial introduction of the research results, their optimization and effective introduction into the practice. The share of innovative ideas in the bakery industry has, until recently, remained low and ineffective for various reasons, and research that can radically change and improve the situation in many cases remain unwanted or ineffective. Most bakery companies are cautious about the development of new foods, since they do not take into account that product diversification and innovations will give them undeniable advantages in the market expansion, provide lower production costs, extra profit, and more economic efficiency [2].

When planning to diversify and innovate, a detailed demand study and a clear demand forecasting for innovative technologies and new foods, as well as for their introduction are essential.

STUDY OBJECTS AND METHODS

Today consumers are becoming more and more demanding: they are interested in unique and healthy foods. Much attention is paid to product quality characteristics, its storage conditions, esthetics and packaging. In this regard, the aim of the research is the theoretical and economic justification for the development of technologies for functional breads, flour confectionary foods based on the correction of their nutrient composition through the use of alternative products of plant raw materials containing biologically valuable ingredients.

We analyzed the current functional breads market in the Russian Federation. A choice of raw materials for the main recipe ingredients used in functional breads making, namely amaranth seeds, lentil and lupine seeds, chufa, carob beans, lactulose and lecithin is explained and experimentally confirmed. We developed a method for preparing bakery in-process products for the reduced technological cycle for functional bakery products making (activated bakery yeast, a modified sourdough for liquid yeast making) with improved biotechnological characteristics of yeast biomass, and also reducing the baking flour use.

We developed the recipes for functional breads and buns and provided the overall effect of ingredient properties on the consumer and medical-biological characteristics of the products. Also the cost of production the expected economic effect was calculated.

The creation and production of innovative functional flour-based products is currently a promising direction for the effective development of enterprises in the industry, since it allows them to compete and to occupy a niche in the new or existing markets that are not yet largely filled [1, 2]. Expansion of the flour products range intended for dietary – preventive and therapeutic – nutrition is proposed to be realized through the use of the ingredients shown in Fig. 1.

The analysis of new foods economic effect was done by standard cost estimate and projected retail prices per 1 tonne of ready-made traditional products (control sample) and new foods (experimental samples). The latter included bread with lentil seeds; “Magiya” roll with amaranth and lupine flour and lactulose prebiotic; “Lecitin” bun with a changed glycemic index with amaranth flour; cakes made with chufa seeds flour; gluten-free foods made with amaranth flour (cakes, crisps, honey cakes and breads).

RESULTS AND DISCUSSION

To demonstrate the perspectives for new foods introduction we calculated the economic effect of lentil flour use meant for technological cycle reduction both: on the stage of pressed yeast activation and on that of liquid yeast making.

Economic effect of lentil flour use at the stage of yeast activation includes bakery flour economizing, simplifying process of yeast activation, reducing activation and dough fermentation, and improving nutritional value and physical and chemical characteristics of the foods (Table 1).

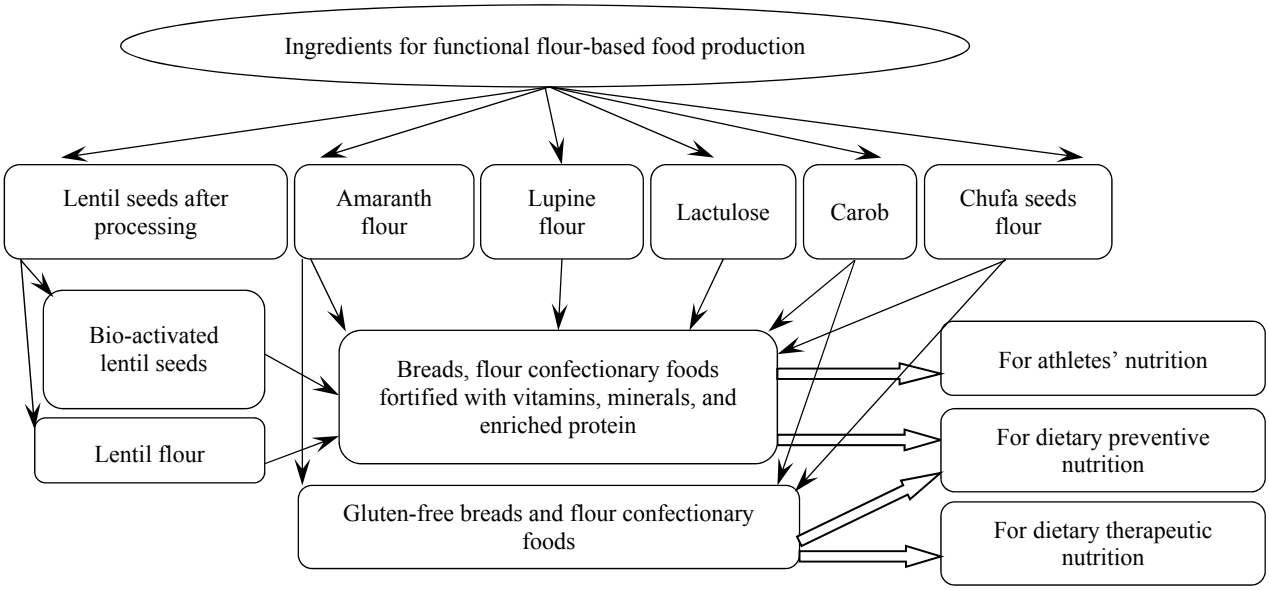

Fig. 1. Components for the production of innovative functional products.

Table 1. Comparison of bakery yeast activation

Criteria	Mixture for bakery yeast activation	
	New	Traditional*
Ingredients	Lentil flour (5% of wheat flour in dough) and non-fermented rye malt (0.5–1.5% of wheat flour)	Dark wheat flour (4% of wheat) non-fermented rye malt (1%), soya flour (1%)
Stages	1. Sourdough with lentil flour making, adding non-fermented rye malt 2. Yeast activation for 20–30 minutes	1. Wheat flour sourdough, adding non-fermented rye malt and more wheat and soya flour 2. Yeast activation for 1–2 hours
Effect	1. 25–30% less use of pressed yeast 2. Improved yeast quality 3. Less bakery flour used for activation, increased bread yield 4. Decreased dough fermentation (1.3 times) due to more intense acid accumulation 5. Increased biological protein value and the whole food value 6. Breadcrumb porosity is 4.3% higher	25–30% less use of pressed yeast

Table 2. Cost estimates and projected wholesale price for lentil breads (0.5 kg)

Calculation items	Unit costs, rbls:					
	Wheat (control)	Native lentil flour	Hydrolyzed lentil flour	Hydrolyzed lentil flour (1/3NaCl substituted KCl)	Lentil flour sourdough	Hydrolyzed lentil flour sourdough
Primary products, basic and supporting materials	13,274	16,130	16,415	16,584	16,130	16,673
Transportation and purchasing costs	1,327	1,290	1,313	1,327	1,290	1,334
Fuel	1,327	806	821	663	645	834
Energy consumption	1,327	806	821	663	645	834
Salary	2,655	2,505	2,505	2,505	2,505	2,505
Social insurance costs	802	756	756	756	756	756
Maintenance expenses	664	626	626	626	626	626
General expenses	664	626	626	626	626	626
Input costs	22,040	23,817	24,154	24,021	23,494	24,459
Selling expenses	170	183	186	185	181	188
Total cost	22,210	23,545	23,883	23,750	23,223	24,188
Cost effect, %	20	10	10	10	10	10
Profit	4,442	2,355	2,388	2,375	2,322	2,419
Wholesale price	26,651	25,900	26,271	26,125	25,545	26,607
VAT	2,665	2,590	2,627	2,613	2,555	2,661
Retail price	29.32	28.49	28.90	28.74	28.10	29.27

The use of lentil flour at the stage of liquid yeast production allows saving basic raw materials, rye flour, as well as improving biotechnological characteristics of yeast: yeast grown on lentil leaven grows 7 minute faster in comparison with yeast grown on rye leaven; the output is 30% higher.

Making liquid yeast with lentil flour promotes significant mix enrichment with digestible monosaccharide and disaccharide, as well as nitrogenous compounds preserving traditional production operations. The nutrients are enough to accumulate biomass and intensify the processes of dough maturation: targeted dough acidity is reached within 120 min., the whole technological process is 30 min shorter.

The new way of liquid yeast making demonstrated that cut-straight flour use 100 t of bread per day on traditional liquid yeast is 414 kg. Lentil flour makes it possible to get 600 kg bread per day. The results are obtained at Bread-baking plant № 1, Voronezh, Russia.

Lentil flour incorporation in wheat dough is possible in a native or hydrolyzed way, as well as a compound of sourdough. We calculated the requirements and costs of raw materials and supporting materials. The results of cost estimates and projected retail price are given in Table 2.

There is a slight increase of expenses share for raw materials and supporting materials (60.23% for control samples vs. 64.92% for experimental samples). Expenses for electricity and fuel are double less, due to the reduction of sourdough making and dough fermentation as a result of microbiological and biochemical process intensification.

Salary costs were fixed for a control sample, as more production staff was not needed. The calculations demonstrate that input costs of the new product and a retail price (20% cost effect) is insignificantly higher than those of a control sample (Table 2, Fig.3).

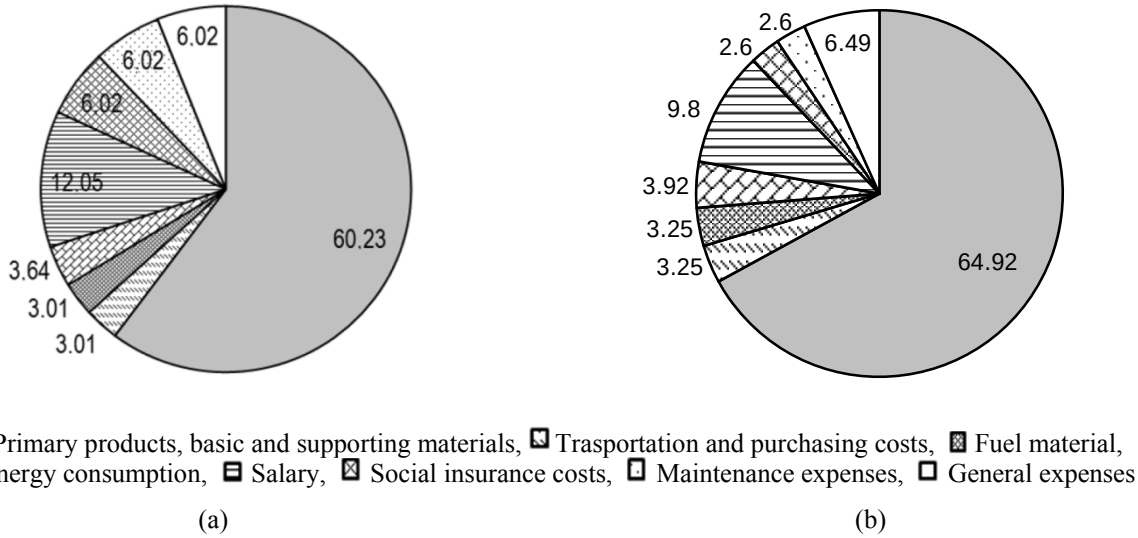

Fig. 2. Input costs, %. (a) – wheat bread; (b) – and hydrolyzed lentil flour (1/3 NaCl was substituted with KCl).

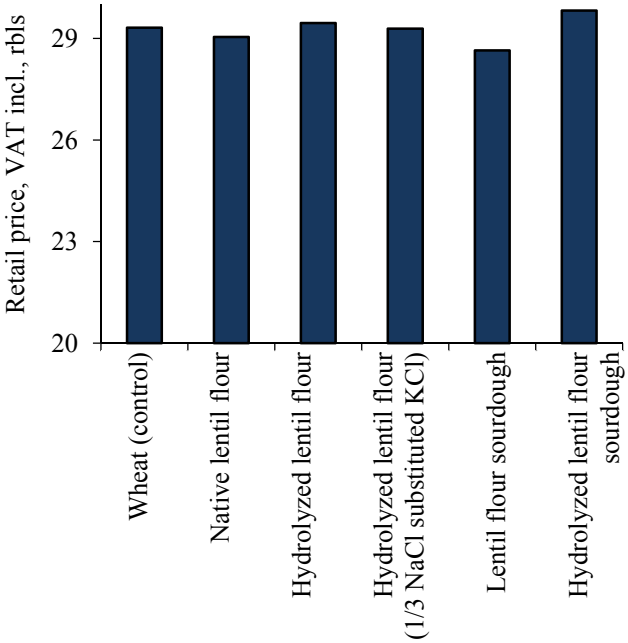

Fig. 3. Retail price for wheat bread with lentil flour (0.5 kg).

Bread with lentil flour does not involve extra expenses for staff and basic resources, which makes it possible to utilize existing equipment. Economic effect calculations offer a gradual market introduction for a new product, as it allows reducing the risks connected with a lack of demand. A manufacturer bears the costs for the in-parallel production of a familiar product and a new one with improved consumer properties and increased productivity though.

The increased output of the product to the level of line capacity allows a manufacturer to improve profitability and profit due to competitive product of a high quality which is in demand with different segments of the population.

Production efficiency of 1 tonne bread sales with lentil flour is 5,030–5,239 rbls (10% cost effect) and can be significantly increased in case of production volume growth and corresponding cost effect growth.

Valuable properties of amaranth grain make it a unique food in a modern world as the problem of protein intolerance of traditional cereals (wheat, rye, barley, oats) is getting more and more pressing. Besides, introduction of foods with amaranth seeds into antisclerotic diet has been proved effective due to their lipid-lowering effect [3]. The findings in [4] allow concluding that production of functional gluten-free foods from amaranth flour is possible.

The technology of functional flour-based foods allows using sweet lupine flour. Proportions of flours allow changing flour baking properties or/and improving products' nutritional value. A considerable amount of potassium and magnesium in lupine flour makes it a perfect ingredient in foods, suitable for heart disease prevention. Fibre is good for obesity, diabetes and other diseases prevention. Lactulose is beneficial to the whole body; relieves the toxic liver disease, when ammonia is produced by putrefactive bacteria there [5, 6]. Besides, lactulose is best for atherosclerosis prevention by lowering cholesterol level in blood.

The requirements and cost of raw and supporting materials for "Magiya" roll with amaranth, lupine flour and lactulose (per 1 tonne) are calculated. The results of cost budget and projected wholesale price per 1 tonne of end product are given in Table 3.

Production efficiency of 1 tonne "Magiya" roll bread sales is 6,213 rbls (10% cost effect) and can be significantly increased in case of production volume growth and corresponding cost effect growth. Amaranth and lupine flours together with lecithin and lactulose bring a vast improvement: protein content increased by 36.7%, Ca, Mg, K, and P – by 15.1%, 22.8%, 14.8%, and 14.7% respectively; β-carotene – 3.42; B_1 and B_2 vitamins – 7.0% and 4.29%. Energy increased value only – by 3.7%. The roll (100 gr) fills in the need in phospholipids (20.6%), phosphorus (15.1%), β-carotene (22.6%), and lactulose (100%).

Table 3. Cost estimates and projected wholesale prices for "Magiya" roll (per 1 tonne)

Calculation items	Costs per 1 tonne, rbls:	
	Twist roll	"Magiya" roll
Primary products, basic and supporting materials	24,734	43,448
Transportation and purchasing costs	2,473	4,345
Fuel	2,473	2,473
Energy consumption	2,473	2,473
Salary	4,947	4,947
Social insurance costs	1,494	1,494
Maintenance expenses	1,237	1,237
General expenses	1,237	1,237
Input costs	41,069	61,654
Selling expenses	316	475
Total cost	41,385	62,128
Cost effect, %	20	10
Profit	8,277	6,213
Wholesale price	49,662	68,341
VAT	4,966	6,834
Retail price	54,629	75,175
Price for one (0.4 kg), rbls	21.85	30.07

Table 4. Cost estimates and projected wholesale price for "Lecitinochka" bun (per 1 tonne)

Calculaton items	Costs per 1 tonne, rbls:		
	Bun (control)	"Lecitinochka" bun withclactulose	"Lecitinochka" bun with carob
Primary products, basic and supporting materials	47,241	67,003	72,822
Transportation and purchasing costs	4,724	6,700	7,282
Fuel	4,724	4,724	4,724
Energy consumption	4,724	4,724	4,724
Salary	9,448	9,448	9,448
Social insurance costs	2,853	2,853	2,853
Maintenance expenses	2,362	2,362	2,362
General expenses	2,362	2,362	2,362
Input costs	78,438	100,177	106,578
Selling expenses	604	771	821
Total cost	79,042	100,948	107,399
Cost effect, %	20	10	10
Profit	15,808	10,095	10,740
Wholesale price	94,851	111,043	118,139
VAT	9,485	11,104	11,814
Retail price	104,336	122,148	129,953
Price per one (0.2 kg), rbls	20.86	24.43	25.99

Market research conducted by I.B. Krasina [7] shows that flour-based confectionary foods, diabetic-friendly ones in particular, with chocolate taste are in great demand with population. Chocolate ingredients are unadvisable due to increasing blood glucose properties though. The problem can be solved by carob use. It can substitute cacao and sugar (chocolate) for diabetic patients and those with overweight.

Carob has much fibre, insoluble one in particular, and is classified as a food with low glicaemic index [9]. The requirements and cost for raw material suppporting materials for "Lecitinochka" bun (per 1 tonne) are calculated. The results of cost budget and projected wholesale price per 1 tonne of end product are given in Table 4.

Production efficiency of 1 tonne "Lecitinochka" bun with lactulose sales is 10,095 rbls, "Lecitinochka" with carob – 10,740 rbls, (10% cost effect) and can be significantly increased in case of production volume growth. 4% of carob in the recipe (Lecitin bun with carob) results in the following changes in nutritional value: the content of proteins increased by 27.09%, fats – by 11.11% (phospholipids – 49.82 times), and fibres – by 1.8 times, while the content of carbohydrates decreased by 2.78% (monosaccharides and disaccharides – 17.30%). The price of the carob bun is only 6% higher than the one without carob, which is 1.56 rbls for 0.2 kg.

Present-day market necessitates developing innovative functional foods. One of the much-promising market sectors is gluten-free foods, the demand for which is only rising. Statistics shows that annual average growth rate for gluten-free foods over a period of 2009–2014 is 12.3% (based on sales volume analytics in France, Germany, Italy, Netherlands, Russia, Spain, Sweden, the UK, Brazil, the USA, Australia, China, India, Japan, and Korea) [10]. By the year 2020, gluten-free food market is expected to expand and will grow by 1.7 compared to 2015, which means 11% annual increase. Demand growth is driven by the following factors:

– Improved diagnostics allows detecting more cases of celiac and other gluten-sensitive diseases. The only treatment for these patients is strict long-lasting or life-long gluten-free dieting;

– New consumer segment expansion – those people who consider gluten-free foods as an important constituent of healthy lifestyle [12].

Such a situation forces Russian companies to introduce gluten-free foods into production, promoting imports replacement and expanding a customer base [11].

The crucial problem is a search of raw materials with high consumer properties [12, 13]. Our market study and calculations show that chufa seeds and amaranth grain for gluten-free breads and buns are economically viable.

Chufa seeds have a great amount of unsaturated fatty oils and vitamin E, which make them attractive for dietary, disease-preventive food making: they lower blood cholesterol. Besides, chufa is gluten-free, rich in potassium and phosphorus, low in sodium – good for nutrition of those with overweight, cardio-vascular diseases, high blood pressure, and kidney failure [4].

We chose "Stolychny" cake as a sample flour-based food with chufa seeds as it is a low-cost and absolute consumer favourite. We calculated requirement and cost of raw and supporting materials for cake production. "Stolychny" cake with wheat flour was as a control, sample No.1 contained 60:40 wheat and chufa

wheat, sample No.2 – gluten-free chufa flour (per 1 tonne). The results of cost budget and projected wholesale prices are given in Table 5.

The estimated productive efficiency of 1 tonne cake sale a mix of wheat and chufa flour (60:40) is 11,022 rbls, while the sales of sample cakes No.2 reached 16,425 rbls. Retail price of sample cakes No.2 is 2 times higher than that of a "Stolychny" cake and equals to 143,065 rbls per 1 tonne or 7.15 rbls for a 0.05 kg. It is worth noting that it is a gluten-free food, the established price for gluten-free cakes is 364–465 rbls per a 170–250 gr per pack (e.g. http://glutenfree.su/catalog/khleb/dr-schar: the price for "Magdalenas" muffins by *Santiveri* (Spain) is 364 rbls (170 g), gluten-free cakes with apricot jam "Magdalenas" by *Dr. Schar* (Italy) is 370 rbls (200 g), gluten-free cake "Marmorkuchen" by *Dr. Schar* is 465 rbls (250 g).

So, the price of the chufa cake is much lower than that of its import equals. It is worth noting that there are no cakes with chufa seeds flour in the market and it is an additional competitive advantage.

We calculated requirement and cost of raw and supporting materials for gluten-free foods (cakes, honey-cakes, crisp breads, and bread). The results of cost budget and projected wholesale prices are given in Tables 6–8.

The estimated productive efficiency of 1 tonne gluten-free "Vdokhvenie" cakes is 16,211–16,971 rbls. Retail price of "Vdokhvenie" cakes is 1.1 times or by 9.7% higher than that of "Stolychny" cakes (price growth is due to raw materials costs). The price of "Vdokhvenie" cakes is 8 times lower than that of the gluten-free cakes from Italy and Spain, and 2 times lower than the price of "Chudesnitsa" cakes from Belarus. Russian and European gluten-free food markets lack cakes baked with amaranth flour.

Productive efficiency of 1 tonne sale of amaranth gluten-free bread is 16,128 rbls (10% cost effect), retail price is 58.55–61.67 rbls (0.3 kg) (Table 8).

Gluten-free "Amarantovy" bread has a competitive advantage: its price is 4.6–8.1 times lower (according to http://glutenfree.su/catalog/khleb/dr-schar, the price of Campagnard bread by *Dr. Schar*, 380 rbls for 240 g; "MB Classic" bread by *Dr. Schar* (Italy), 370 rbls for 300 g; gluten-free white bread and low-protein bread by *Bezgluten* (Poland), 260 and 270 rbls for 260 and 300 g respectively.

Table 5. Cost estimates and projected wholesale prices for chufa seeds cakes (per 1 tonne)

Calculation items	Costs per 1 tonne, rbls:		
	"Stolychny" cake	sample No.1 (wheat and chufa flour)	sample No.2 (gluten-free chufa flour)
Primary products, basic and supporting materials	42,103	85,783	139,404
Fuel	4,210	4,210	4,210
Energy consumption	4,210	4,210	4,210
Salary	8,421	8,421	8,421
Social insurance costs	2,543	2,543	2,543
Maintenance expenses	2,105	2,105	2,105
General expenses	2,105	2,105	2,105
Input costs	65,697	109,377	162,998
Selling expenses	506	842	1,255
Total cost	66,203	110,220	164,253
Cost effect, %	20	10	10
Profit	13,241	11,022	16,425
Wholesale price	79,444	121,242	180,678
VAT	14,300	21,823	32,522
Retail price, VAT incl.	93,744	143,065	213,200
Price per one (0.05 kg), rbls	4.68	7.15	10.66

Table 6. Cost estimates and projected wholesale prices for gluten-free amaranth flour cakes (per 1 tonne)

Calculation items	Costs per 1 tonne, rbls:				
	"Stolychny" cake	"Vdokhvenie" cake	"Vdokhvenie" cake with molasses	"Vdokhvenie" cake with an emulsifier	"Vdokhvenie" cake with pectin
Primary products, basic and supporting materials	89,344	116,745	116,612	110,798	118,347
Fuel	8,934	8,934	8,934	8,934	8,934
Energy consumption	8,934	8,934	8,934	8,934	8,934
Salary	17,869	17,869	17,869	17,869	17,869
Social insurance costs	5,396	5,396	5,396	5,396	5,396
Maintenance expenses	4,467	4,467	4,467	4,467	4,467
General expenses	4,467	4,467	4,467	4,467	4,467
Input costs	139,412	166,814	166,680	160,867	168,416
Selling expenses	1,073	1,284	1,283	1,239	1,297
Total cost	140,485	168,098	167,964	162,105	169,712
Cost effect, %	20	10	10	10	10
Profit	28,097	16,810	16,796	16,211	16,971
Wholesale price	168,583	184,908	184,760	178,316	186,684
VAT	30,345	33,283	33,257	32,097	33,603
Retail price, VAT incl.	198,927	218,191	218,017	210,413	220,287
Price per one (0.05 kg), rbls	9.94	10.91	10.90	10.52	11.01

Table 7. Cost estimates and projected wholesale prices for gluten-free amaranth honey cakes and crisps (per 1 tonne)

Calculation items	Costs per 1 tonne, rbls:			
	Gluten-free amaranth honey cakes	Crispy bread "Elizaveta" (control)	Crisps	
			sample No.1	sample No.2
Primary products, basic and supporting materials	80,730	24,246	72,008	72,493
Fuel	8,073	2,425	2,425	2,425
Energy consumption	8,073	2,425	2,425	2,425
Salary	16,146	4,849	4,849	4,849
Social insurance costs	4,876	1,464	1,464	1,464
Maintenance expenses	4,037	1,212	1,212	1,212
General expenses	4,037	1,212	1,212	1,212
Input costs	125,971	37,834	85,595	86,081
Selling expenses	970	291	659	663
Total cost	126,941	38,125	86,254	86,744
Cost effect, %	10	20	10	10
Profit	12,694	7,625	8,625	8,674
Wholesale price	139,635	45,750	94,880	95,418
VAT	25,134	8,235	17,078	17,175
Retail price, VAT incl.	164,769	53,985	111,958	112,593
Price for one (per 1 kg), rbls	164.77	53.98	111.95	112.59

Table 8. Cost estimates and projected wholesale prices for amaranth bread (per 1 tonne)

Calculation item	Costs per 1 tonne, rbls:		
	Control (flour mix *Mix B* by *Dr. Schar*)	Gluten-free "Amarantovy"	Gluten-reduced "Amarantovy"
Primary products, basic and supporting materials	333,703	96,393	104,941
Fuel	9,639	9,639	9,639
Energy consumption	9,639	9,639	9,639
Salary	19,279	19,279	19,279
Social insurance costs	5,822	5,822	5,822
Maintenance expenses	4,820	4,820	4,820
General expenses	4,820	4,820	4,820
Input costs	397,361	160,050	168,598
Selling expenses	3,060	1,232	1,298
Total cost	400,420	161,283	169,896
Cost effect, %	10	10	10
Profit	40,042	16,128	16,990
Wholesale price	440,462	177,411	186,886
VAT	44,046	17,741	18,689
Retail price, VAT incl.	484,508	195,152	205,575
Price for one (0.3 kg), rbls	145.35	58.55	61.67

CONCLUSION

In unsteady environment it is of utmost social importance to provide people with high quality local foods. The production of high quality innovative foods is a basis for market development for all manufacturers, including the bakery industry.

One of the reasons for flour-based market contraction is considered to be people's changing nutrition habits: their taste preferences, changing consumer needs, and, as a consequence, a changing list of basic foods. Bread and buns sales are connected with people's prosperity growth: we can trace the transition from their buying cheap, high-calorie foods (usually of foreign production) to more costly, healthy, and high-quality local foods [14, 15].

In view of holding a share of the market, to make commercial breads is not enough, a wide range of such products as functional and dietary ones should be produced taking into consideration consumers' prevailing habits. Besides, low profitability of bakery businesses objectively slows down their modernization. The problem of technical re-equipment is more pressing than ever before. Low-output, rundown, outdated equipment leads to products high cost prices as well as to low quality products. It is particularly vital today when the output of functional flour-based foods, enriched with vitamins, minerals and bioactive compounds is dramatically low.

Based on the research findings and technological and economical aspects of functional foods production, it may be deduced that our innovation foods do not know local and foreign equals.

We showed the possibility to increase bakery in-process parts production efficiency, meant for reduced technological cycle (blends for bakery pressed yeast activation liquid yeast making are patented) due to the improvement of yeast bio-technological characteristics as well as to the use of lentil flour in the recipe, which

eventually leads to economic performance Product quality characteristics allow defining it as a highly competitive, innovative, in great demand in the dietary market. The foods can be recommended for commercial production at local enterprises.

The use of the above mentioned ingredients for functional flour-based foods will contribute toward product quality improvement, the expansion of product range, the use of local raw materials, the growth of target profit, and companies' economic results improvement and their competitive growth.

CONFLICT OF INTEREST

The authors state that they have no conflict of interest.

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