CHAPTER 17

TECHNOLOGY OF CRAFT BREAD WITH LIVE SOURDOUGH

Medvedieva A. O., Antonyuk I. Yu.
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INTRODUCTION

Bread is one of the oldest and most important foods in human history. It is an integral part of the culture of many peoples and continues to play a significant role in the diets of people around the world.

In the current conditions of development of the food industry and restaurant industry, there is a growing interest among consumers in high-quality, natural and authentic food products and dishes. The craft products segment, which is distinguished by its original recipes, high production standards, use of local raw materials, and manual labor, has become particularly popular in recent years. One of the brightest examples of this trend is the production of craft bread, a natural product without the use of chemical additives, with a deep taste, traditional cooking technology and a unique recipe[1].

Development of new types of bread using non-traditional grains (e.g. spelt, quinoa, amaranth), starter cultures with probiotic properties, functional additives (seeds, spices, vegetables, superfoods) and modern technologies (low-temperature fermentation, gluten-free production) allows you to satisfy the growing demand for healthy food, expands the range of products and at the same time is relevant for the development of the restaurant industry, craft production and the country's food industry[2].

1. Analysis of the range of similar products in the craft bread production market

Ukraine has long been known as the «granary of Europe», and for centuries bread was not only the basis of the diet, but also a sacred thing, deeply rooted

[1] Красноруцький О.Б Брендинг та крафтові технології аграрних підприємств: стратегічний аспект. Вісник Хмельницького національного університету. 2023. № 3. С. 20. URL: https://surl.li/zueolj.

[2] Новікова О.В. Технологія виробництва хлібобулочних і борошняних кондитерських виробів: навч. посібник. К.: Видавництво Ліра-К, 2017. 540 с.

in the everyday life, rituals, and culture of the people. In villages, it was baked in clay ovens with its own sourdough, using rye, wheat, buckwheat, or corn flour. It is these traditional recipes and artisanal approaches, preserved in the villages, that became the basis for modern craft breadmaking[3].

With the impact of Soviet industrialization, breadmaking in Ukraine underwent massive centralization. Large bakeries provided mass production of standard yeast bread, which was supposed to be cheap and accessible, but such bread lost its deep flavor, quality ingredients, and lengthy fermentation process. During this period, craft recipes were pushed out of the cities, but continued to live on in rural areas and among individual craftsmen[4].

After the declaration of independence in 1991, a process of rethinking the gastronomic heritage began in Ukraine. In the 1990s–2000s, the first private small bakeries and home producers appeared, returning to baking sourdough bread, from natural flour, without artificial additives. At the same time, interest in healthy eating grew, which contributed to the revival of traditional crafts and approaches[5].

Between 2020 and 2025, craft bread baking in Ukraine experienced a real boom. People increasingly appreciate the naturalness, quality, and local origin of products. Mini-bakeries, farm bakeries, and bakeries attached to coffee shops are developing rapidly. Famous Ukrainian brands have begun to successfully combine traditional recipes with modern marketing approaches. An additional impetus to the development of craft production was given by the coronavirus pandemic and the war, which highlighted the need for conscious consumption and support for local producers, in particular through the popularization of homemade bread[6].

Craft bread differs significantly from industrial bread in both the manufacturing method and the quality of ingredients, fermentation duration, flavor characteristics, and overall production philosophy. It is prepared by hand or with minimal use of machinery, focusing on the baker's skill and individual approach. While industrial bread is produced on automated lines on a large scale, craft bread is baked in small batches, often locally[7].

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[3] Хлібопекарська галузь України в умовах воєнного часу. URL: https://www.researchgate.net/publication/369525425_Hlibopekarska_galuz_Ukraini_v_umovah_voennogo_casu.

[4] Хліб з місця сили. Історія крафтової пекарні, що відкрилася на другий день великої війни. URL: https://epravda.com.ua/publications/2023/04/06/698818.

[5] Калініченко Л.Л. Проблеми розвитку крафтової діяльності в Україні. Економіка: реалії часу : науковий журнал. 2022. № 5 (63). С. 26–33. С. 28.

[6] Кузьо Н. Є., Косар Н. С., Пагута М. Г. Дослідження ринку хліба та хлібобулочних виробів України та обгрунтування товарних інновацій виробників на ньому. Економіка і суспільство. 2017. №. 12. С. 284-291.

[7] Радькова В. Є. Дослідження ринку та удосконалення споживчих властивостей хліба. Збірник наукових праць студентів, Луганськ, ДЗ «ЛНУ імені Тараса Шевченка. 2013. Т. 2. С. 95-106.

The basis of craft bread is natural ingredients: flour, water, salt, and live yeast, without any artificial additives, improvers, or preservatives. Instead, industrial bread often contains yeast, baking powder, stabilizers, flavorings, and emulsifiers, which extend shelf life and improve presentation, but harm the naturalness of the product.

One of the important aspects in bread production is the fermentation process. In craft baking, the dough ripens slowly – up to 24 hours, which gives it a deep taste, a distinct aroma and makes it easier to digest. In contrast, in industrial production, fermentation lasts only 1–2 hours, mostly with pressed yeast, which affects the taste. Accordingly, craft bread has a crispy crust, elastic porous crumb and rich flavor, while industrial bread is often characterized by a soft, homogeneous structure and a neutral or yeasty flavor[8].

Due to the lack of preservatives, craft bread does not keep for long, usually 1–3 days, unlike industrial bread, which can last up to a week or longer. But the main difference lies in the approach: craft baking is about quality, respect for traditions, naturalness, and supporting the local economy, while industrial production is focused on volume, standardization, and profitability.

Slow fermentation improves the absorption of nutrients such as calcium, magnesium and iron and reduces phytates (substances that can interfere with mineral absorption).

Sourdough contains beneficial bacteria that support intestinal microflora, improve digestion, and help maintain stomach health.

Many types of craft bread (especially rye or whole grain breads) have a lower glycemic index (GI) compared to industrial bread. This means that their consumption contributes to a slower rise in blood sugar levels, which is beneficial for people with type 2 diabetes or those monitoring their blood sugar levels.

Craft bread is often made with the addition of various types of flour – rye, buckwheat, corn, which increases its nutritional value. This bread contains more fiber, vitamins (especially group B) and minerals (magnesium, potassium, iron), which helps normalize metabolism, maintain a healthy cardiovascular system and improve skin condition[9].

Craft bread is made without the addition of compressed yeast or chemical leavening agents, which can reduce the risk of bloating, excessive gas, and other gastrointestinal problems that often occur after consuming foods containing artificial additives.

Although most types of Craft bread contain gluten, there are also gluten-free

[8] Крафтова випічка як особливий вид хлібного мистецтва. URL: https://surl.li/gdabbs.

[9] Кульчицька А. Є., Царьова Т. О. Специфіка та тенденції розвитку ринку крафтової продукції в Україні. Актуальні проблеми економіки та управління. № 12. 2018. С. 3–14.

options on the market. These are beneficial for people with celiac disease or gluten intolerance because they do not cause negative reactions in the body.

Because Craft bread often does not contain trans fats or artificial fats, it is less harmful to the cardiovascular system compared to industrial breads, which use low-quality vegetable fats.

Due to the presence of whole grain flours, vitamins, and minerals present in Craft bread, this product can have a positive effect on skin health. For example, vitamin E, magnesium, and omega-3 fatty acids found in some varieties of Craft bread may help maintain healthy skin and reduce inflammation.

Craft bread can be healthy due to the use of natural ingredients, lack of artificial additives, long fermentation, and variety of ingredients. However, it is important to remember that even Craft bread should be consumed in moderation, as it is a high-calorie product.

Thus, craft bread is a «living» product with a soul, created with care for people, health, and nature, while industrial bread is a convenient and mass-produced product devoid of individuality.

The concept of «craft» in baking has its roots, craft means «skill». The term initially gained popularity in the United States in the 1970s and 1980s, where it referred to artisanal, hand-made beer (craft beer) as an alternative to mass-produced industrial products. Over time, the idea of craftsmanship spread to other areas: cheesemaking, chocolate, coffee, and later bread baking[10].

Today, «craft» bread means:

- bread made by hand or in small batches;
- from natural ingredients, without additives;
- with slow fermentation on sourdough;
- with an emphasis on quality, authenticity and tradition, not on volume.

The term «craft» today is not just about a method of preparation, but about a philosophy of production, where respect for bread, the baker's skill, conscious consumption, and a connection with local culture are the main things.

The range of craft bread on the Ukrainian market is expanding significantly due to the increasing demand for natural, healthy and unique products. The range includes various types of bread from traditional wheat to innovative options, such as gluten-free or bread with added spices and olives.

The modern artisanal bread baking market is gradually shifting towards naturalness, functionality, and uniqueness of each product. One of the key areas of innovation is the use of non-traditional types of flour – spelt, buckwheat, corn, whole grain, which makes it possible to create new flavor combinations,

[10] Крафтові технології: гастрономічні інновації : зб. наук. ст. студ. / відп. ред. Т. І. Юдіна. Київ : Київ. нац. торг.-екон. ун-т, 2021. 114 с.

improve the nutritional value of bread, and meet the needs of people with dietary restrictions.

Additional appeal to craft products is given by the use of innovative fillings and additives: seeds, nuts, dried fruits, herbs, vegetables, which enrich the taste and aroma of bread.

Modern cooking methods play a significant role in improving the quality of products: the use of sourdough, prolonged fermentation, and baking in a wood-fired oven contribute to improving the structure, benefits, and naturalness of the product.

Superfoods are actively integrated into bread production: spirulina, amaranth, chia seeds, sea buckthorn, and activated charcoal, which form bread as a functional product with high health-promoting potential. The expansion of the line of gluten-free products based on pseudocereals (buckwheat, chickpeas, corn, flax) is a response to the growing demand from people with gluten intolerance[11].

Functional bread deserves special attention – yeast-free, enriched with fiber, proteins, and vitamins, which is fully consistent with modern principles of healthy eating.

Table 1 lists innovative products used in the production of craft bread.

Table 1

List of innovative products in the production of craft bread

Category	Examples
By type of flour	Rye, wheat, whole grain, buckwheat, corn, spelt
For the filling	With seeds, nuts, dried fruits, herbs, tomatoes, olives
By baking method	Sourdough, in a wood-fired oven, with long fermentation
With superfoods	Chia seeds, flax seeds, amaranth seeds, spirulina, activated charcoal, sea buckthorn seeds, etc
Gluten-free bread	From buckwheat, rice, chickpeas, flax, corn or a mixture of pseudocereals
Functional bread	Enriched with fiber, protein, yeast-free

Developed by the authors based on source [12 ,13, 14,15]

[11] Замай Ж. В., Гуменюк О. Л., Волкова Р. М., Хребтань О. Б., Цибуля С. Д., Пасов Г. В. Використання інноваційної сировини (кіноа, чорний кмин, кунжут) та її вплив на властивості пшеничного хліба. *Наукові праці НУХТ 2021*. Том 27, No 3, С.103-111.

[12] Васьківська А. О., Пересічна С. М. Технологія бездріжджового хліба з використанням безглютенової сировини. Таврійський науковий вісник. Серія: Технічні науки. 2022. №4. 44-54.

[13] Дзюндзя О, Звагольська К. Аналіз нетрадиційної борошняної сировини для виробництва хлібобулочних виробів. Таврійський науковий вісник. Серія: Технічні науки, № 1. 2021. 22-29.

[14] Дробот В.І., Приходько Ю.С., Бережна Г.О. Борошно сорго у технології безглютенового хліба. Наукові праці Національного університету харчових технологій, 2019. № 1: С. 208.

[15] Євчук Я.В. Застосування нетрадиційної сировини в технології хліба. Вісник ЖНАЕУ, 2017, № 1 (58), т. 1 211-221.

The analysis of the range of craft bread on the Ukrainian market showed that this segment is dynamically developing and is characterized by a high level of diversity both in terms of composition and technological features of the products. Domestic manufacturers offer a wide range of craft bakery products that meet the demand of various target audiences, from fans of traditional tastes to consumers with specific dietary needs.

The dominance of wheat bread with various innovative additives (olives, rosemary, chocolate, seeds, tomatoes) indicates the active use of original recipes to create a unique flavor profile of products.

The popularity of sourdough bread as a symbol of naturalness and a return to traditional fermentation technologies. Sourdough is used not only in rye but also in wheat breads, which adds beneficial properties and improves taste.

It is also important to note that craft bakeries are actively experimenting with shape, texture, and ingredients, offering consumers new taste experiences. This creates a positive image of craft bread as an innovative and useful product. Here is a list of some of the types of craft bread on the Ukrainian market (Table 2).

Based on the studied assortment of craft bread, it is possible to form a competitive product line focused on modern consumer demands regarding the quality, benefits, and uniqueness of bakery products. The analysis of Table 2 confirms the high potential for the development of innovative types of craft bread in bakeries in Ukraine.

Craft bread is often positioned as a natural product, made without preservatives and from high-quality raw materials, which meets the growing demand for healthy food. Trends towards veganism, gluten-free diets, low-calorie foods, and interest in organic products may contribute to an increase in demand for these types of bread. In addition, the popularity of gluten-free bread and options with added superfoods, such as seeds, nuts, and other superfoods, confirms this positive trend.

The main target audience for craft bread is people aged 26 to 50, who are focused on a healthy lifestyle. In addition, there is a strong demand for premium products among the middle class and affluent consumers, to which craft bread is often attributed.

The growing popularity of craft bakeries and local producers in cities creates a competitive environment, but also opens up opportunities for the development of this niche if the product has unique properties. High quality and the use of exclusive ingredients can be key factors for standing out in the market.

A separate niche (10%) is occupied by consumers with dietary restrictions who are focused on gluten-free products or bread with a reduced allergen content, which creates prospects for the development of a specialized assortment. The tourist segment, although smaller (15%), provides additional impetus for sales

due to the demand for authentic and unique products, in particular artisanal sourdough bread, combined with local ingredients.

Table 2

Analysis of the assortment of craft bread on the Ukrainian market

Manufacturer	Product	Product description	Bread type
Bakery «Craft», Khmelnytskyi	Sourdough bread	Traditional sourdough wheat bread with a crispy crust	Wheat, sourdough
Bakery «Good Traditions», Sniatyn	Rye bread	Sourdough bread, delicious and with a pronounced taste of rye flour	Rye, sourdough
Bakery «Dobry Hlib», Lviv	Bread with sunflower seeds	Wheat bread with sunflower seeds, fragrant and healthy	Wheat, with seeds
«Wood-fired Bakery», Pryluky	Ukrainian palyanichny bread	Traditional Ukrainian bread, baked over wood, with natural ingredients	Wheat, traditional
Bakery "Village Bread", Odessa	Sourdough bread	Kvass-based bread, rich in flavor and with a special texture	Fermented
Bakery «2 Batona», Kharkov	Bread with olives and rosemary	Wheat bread with olives and rosemary	Wheat, with olives
Bakery «Territoryya smaku», Ivano-Frankivsk	Bread with dark chocolate	Пшеничний хліб з додаванням чорного шоколаду та горіхів	Wheat, with chocolate
Bakery «Homemade delicacies», Zhytomyr	Buckwheat bread	Bread with added buckwheat flour	Wheat, with buckwheat flour
Bakery «Khlibny Kray» Volyn region, Kovel district, Radovychi village	Chia bread	Wheat bread with chia seeds, good for digestion	Wheat, with chia
Bakery-cafe «Zerno», Irpin	Tomato bread	Sourdough bread with tomatoes and spices	Wheat, sourdough

Developed by the authors based on sources [16] [17] [18] [19] [20] [21] [22] [23] [24] [25]

[16] Пекарня «Крафт». URL: https://surl.li/ylponu.
[17] Пекарня «Добрі Традиції». URL: https://surl.lu/kvqqux.
[18] Пекарня «Добрий хліб». URL: https://surl.li/oawoip.
[19] «Пекарня на Дровах». URL: https://surli.cc/ozdmku.
[20] Пекарня «Сільський хліб». URL: https://hleb.com.ua.
[21] Пекарня «Шерегет». URL: https://surl.li/uwhxuc.
[22] Пекарня «Територія смаку». URL: https://surl.lu/aawshe.
[23] Пекарня «Домашні смаколики». URL: https://surl.li/lolnir.
[24] Пекарня «Хлібний край». URL: https://surl.li/rvsmbc.
[25] Пекарня-кав'ярня «Зерно». URL: https://surli.cc/cexrij.

Let's consider the activities of successful craft bakeries in Ukraine and the world. Successful bakeries both in Ukraine and abroad actively integrate innovations into the production process, while maintaining attention to traditional methods. They emphasize naturalness and locality, using organic and local products, which increases appeal among consumers focused on healthy eating. For example, Bakehouse in Kyiv uses farm products and sourdough, which creates a unique taste and increases brand trust[26].

Sourdough starters have become a key innovation in the production of craft bread, significantly improving its quality. This has become a trend in many bakeries, such as Tartine Bakery in the USA and Khlibna Manufaktura in Kharkiv, which use their own sourdough starters to achieve optimal taste qualities[27].

Another important aspect is the social responsibility of bakeries, such as 100% Life Bakery in Odessa, which helps to employ vulnerable groups, such as HIV-positive people. This creates additional value for consumers who support social initiatives.

Sustainability and style are important factors in the popularity of bakeries. Many brands, such as Bageriet B in Sweden, combine delicious products with eco-friendly packaging and a design approach. In Ukraine, bakeries, in particular Khlibna Manufaktura, are actively implementing minimalist design and using environmentally friendly materials for packaging[28].

Additionally, many bakeries, like E5 Bakehouse in the UK, are creating educational programs that allow customers to deepen their knowledge of the bread-making process, which adds additional value and credibility to the brands[29].

Bakeries like Zdobna Pich in Lviv emphasize the importance of regional traditions, reviving authentic recipes and offering them to consumers[30].

Let us give examples of existing craft bakeries in Ukraine and the world (Table 3).

So, the success of a craft bakery depends on several key factors: using quality ingredients, such as organic products and sourdough, having a clear concept, which may include locality, craftsmanship or a social mission, an original visual style covering design and packaging, as well as active communication with consumers through social media, tastings or other interaction formats.

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26 Сторінка в Інстаграм пекарні Bakehouse у Києві. URL: https://surl.li/drvjkz.

27 Хлібна мануфактура в Одесі. URL: https://surl.li/nnftdx.

28 Тенденції розвитку крафтового ринку України. URL: https://surl.lu/qtoiih.

29 Пекарня E5. URL: https://surl.li/zbbzaq.

30 Випічка з пекарні Львова. URL: https://mlyn-bakery.choiceqr.com.

Table 3

Successful craft bakeries in Ukraine and the world

The name of the bakery	City / Country	Format / Specialization	Characteristics of success
Bakehouse	Kyiv, Ukraine	Microbakery, cafe, artisan bread	Sourdough, local farm products, stylish interior
Zdobna Pich	Lviv, Ukraine	Bakery, traditional bread	Emphasis on regional recipes, handmade
Bread Factory	Kharkiv, Ukraine	Artisan bread, signature rolls	Own sourdough, minimalist design, collaboration with coffee shops
100% Life Bakery	Odesa, Ukraine	Social Bakery	Part of a social project for HIV-positive people, a quality product
Tartine Bakery	San Francisco, USA	Famous craft bakery	Founders of the sourdough trend in the US, recipe books, cult status
Poilâne	Paris, France	Historic bakery, artisan bread	Manufactured since 1932, wood-burning stove, international shipping
E5 Bakehouse	London, United Kingdom	Organic bread, educational programs	Own flour production, training courses, sustainable development
Bageriet B	Stockholm, Sweden	Art bakery, a modern interpretation of Scandinavian breads	Design, quality, eco-friendly packaging

Developed by the authors

Overall, there is a steady trend in the development of craft baking, which improves product quality, supports social initiatives and environmental practices, and allows bakeries to create unique offerings for consumers.

2. Consumer characteristics of the gastronomic concept of craft bread

Craft bread technology development is a multi-stage process that combines the traditions of artisanal baking with innovative approaches to recipes, technologies, and consumer expectations[31].

The main goal is to create a product with high nutritional value, unique taste and aesthetic appearance that meets modern trends in healthy and responsible consumption.

[31] Красовська Т. В. Методичні засади формування механізму товарного асортименту на виробничих підприємствах // Економіка та держава. 2016. №2. С. 67-71.

In order to develop innovative craft bread, you need to identify the target audience, choose an innovative idea/concept, select raw materials, develop a recipe, test the product, and create an identity.

This paper examines the issue of developing recipes and technologies for craft bread for sale in a bakery, focusing on the needs of different consumers.

The first type is whole grain bread with flax, sunflower, pumpkin seeds, and tomatoes. This is a healthy choice that includes fiber-rich seeds and whole grain flour, which provides minerals and omega-3s, as well as vitamin C from the tomatoes. This bread has a dense texture and a rich nutty flavor, perfect for breakfast or as an addition to soups and salads.

The second type, a gluten-free bread made with quinoa, chia seeds, and buckwheat flour, is a great choice for those who are gluten intolerant. The quinoa provides protein and amino acids, the chia adds omega-3s and calcium, and the buckwheat flour enriches the bread with iron and magnesium. The soft crumb with a nutty note will be an excellent base for sandwiches and snacks, especially for people with an active lifestyle.

The third type – sourdough, with lavender, honey and dried apricots, is positioned as a premium product due to its exclusive ingredients. Lavender adds a calming effect, honey has antibacterial properties, and dried apricots add sweetness and fiber. The fluffy crumb with the color and aroma of lavender and a hint of honey makes this bread ideal for tea parties or festive occasions.

All three products will be produced in loaf format. These breads will be clearly positioned in the premium segment due to their high quality, unique ingredients, and beneficial properties.

We present the main characteristics of the studied craft bread in Table 4.

Table 4

Characteristics of innovative craft bread

Characteristic	Craft bread		
	Whole grain bread with flax seeds, sunflower seeds, pumpkin seeds and tomatoes	**Gluten-free bread with quinoa, chia seeds, and buckwheat flour**	**Sourdough bread with lavender, honey and dried apricots**
Product description	Fragrant, dense, with a crispy crust and a rich nutty flavor, made with sourdough from whole grain flour, seeds, and tomatoes	Made without wheat flour, only from natural gluten-free ingredients (quinoa, chia, buckwheat)	Exquisite bread with lavender, honey and dried apricots, made with live sourdough, has a delicate aroma and taste

Continuation of table 4

Target audience	People who adhere to a healthy diet are looking for a healthy alternative to bread	People with gluten intolerance, vegans, fitness enthusiasts, people following wheat-free diets	Consumers who appreciate unique products, lovers of gastronomic experiments
Nutritional value	Flax seeds (omega-3, antioxidants), sunflower seeds (vitamins, magnesium, zinc), pumpkin seeds (iron, protein), whole grain flour (fiber, minerals), tomatoes (vitamin C)	Quinoa (protein, amino acids), chia (omega-3, calcium), buckwheat flour (iron, magnesium), low glycemic index	Lavender (calming effect), honey (antibacterial properties), dried apricots (vitamins, fiber)
Texture and taste	Dense, with a crispy crust, rich in nutty flavor	Soft, nutty, moist crumb with the graininess of quinoa	Fluffy crumb with the aroma of lavender and honey, sweet dried apricots add softness and flavor
The shape of the product	Loaf 500 g / 800 g, sliced in paper packaging, in a set of three types of grain bread, portioned	Loaf 400/600 g, portioned	Loaf 300/600 g, gift packaging, portioned
Perfect accompaniment	For breakfasts with cheese, avocado, pâtés, for bruschetta, cream soups and salads	As a base for sandwiches with hummus and vegetables, in healthy eating diets and fitness activities	Suitable for tea or coffee, for picnics, festive events, with jam or butter

Developed by the authors

The presented options for innovative craft bread demonstrate a clear focus on meeting the needs of different consumer segments, offering not only a tasty but also a functional product. Each type of bread has its own unique recipe and technology, target audience, and marketing strategy, which emphasizes the importance of a personalized approach in the production of craft products.

Production is based on traditional technology – bread is made with live sourdough with long fermentation (18–24 hours), using organic raw materials from local suppliers. All products are made by hand, without preservatives and flavor enhancers, with careful quality control at each stage.

The target audience is people who follow a healthy lifestyle, have dietary restrictions (celiac disease, veganism, diabetes), as well as gourmets and young families who value quality and uniqueness in nutrition.

Whole grain bread with flax, sunflower, pumpkin and tomato seeds is made with organic whole grain wheat flour, which provides a high amount of fiber,

minerals and healthy fatty acids. Adding flax, sunflower and pumpkin seeds enriches the bread with omega-3s, antioxidants, protein and minerals, while sun-dried tomatoes add natural flavour and vitamin C. Extra Virgin olive oil improves texture and fat benefits, and natural starter enhances flavour and shelf life.

Gluten-free bread with quinoa, chia seeds and buckwheat flour, thanks to buckwheat flour and quinoa flour, is an ideal choice for people with gluten intolerance. Chia seeds, flaxseed meal, and psyllium boost the nutritional value of the bread, providing omega-3s, protein, calcium, and magnesium. Coconut or sunflower oil adds a nice flavor and texture, and minimal sweeteners help preserve the natural flavor.

Lavender, Honey and Dried Apricot Sourdough Bread is made with a premium wheat flour base for optimal texture. Lavender and honey add antibacterial and soothing properties, while unsulfurized dried apricots add natural sweetness and fiber. Grapeseed oil or butter add tenderness, and vanilla extract enhances the aroma and flavor.

The raw materials used in the production of craft bread are listed in Table 5.

Table 5

List of raw materials for innovative craft bread

Ingredient	Whole grain bread with flax seeds, sunflower seeds, pumpkin seeds and tomatoes	Gluten-free bread with quinoa, chia seeds, and buckwheat flour	Sourdough bread with lavender, honey and dried apricots
Flour/base	Whole wheat flour (organic)	Buckwheat flour, quinoa flour, tapioca or cornstarch	Wheat flour, grade 1 or higher
Liquid	The water is purified	The water is purified	The water is purified
Sourdough / baking powder	Natural wheat sourdough	Psyllium, baking soda + lemon juice or gluten-free baking powder	Natural wheat sourdough
Salt	Sea salt	Sea salt	Sea salt
Sugar/ sweetener	Honey or molasses (optional, to balance the flavor)	Optional: agave/stevia syrup	Natural honey (floral, acacia)
Fats/oils	Extra Virgin Olive Oil	Refined coconut or sunflower oil	Grapeseed oil or butter
Functional additives	Flax seeds, sunflower seeds, pumpkin seeds, dried tomatoes	Chia seeds (soaked), cooked quinoa, flaxseed meal, psyllium	Dried apricots (chopped), dried lavender
Flavorings / other	–	–	Vanilla extract (optional)

Developed by the authors

All craft bread recipes have a clearly defined target audience and use natural and innovative ingredients. The selection of raw materials takes into account both functional needs (healthy eating, gluten-free, dietary requirements) and gastronomic benefits (aroma, taste, texture). Each bread has its own unique properties and offers variety in consumption for different groups of people.

The developed recipes for innovative craft products are presented below. Recipe 1 «Whole grain bread with flax, sunflower, pumpkin and tomato seeds» is presented in Table 6.

Table 6

Recipe 1 for «Whole Grain Bread with Flax, Sunflower, Pumpkin and Tomato Seeds»

Ingredient	Weight, g (per 500 g)	Humidity, %	Dry matter content, kg	Weight, g (per 800 g)	Humidity, %	Dry matter content, kg
Whole wheat flour	250	14	0,215	400	14	0,344
Flax seeds	20	10	0,018	32	10	0,029
Sunflower seeds	20	10	0,018	32	10	0,029
Pumpkin seeds	20	10	0,018	32	10	0,029
Dried tomatoes	30	15	0,026	48	15	0,041
Olive oil	20	0	0,020	32	0	0,032
Natural wheat sourdough	50	60	0,020	80	60	0,032
Sea salt	5	0	0,005	8	0	0,008
The water is purified	85	100	0,085	136	100	0,136
Total mass	500	-	-	800	-	-

Developed by the authors

Overall, recipe 1 is a successful combination of whole grain ingredients, healthy seeds, and flavorful dried tomatoes, making this bread not only delicious, but also a valuable source of nutrients. The use of natural sourdough and olive oil further emphasizes its craft character and high quality.

Recipe 2 «Gluten-free bread with quinoa, chia seeds and buckwheat flour» was developed (Table 7).

Overall, recipe 2 is a successful combination of gluten-free ingredients aimed at creating a delicious and healthy bread for people avoiding gluten.

Recipe 3 «Sourdough bread with lavender, honey and dried apricots» has been developed (Table 8).

Overall, recipe 3 is an original combination of wheat flour, natural sourdough, fragrant lavender and honey, and sweet dried apricots. This bread

stands out with its unusual flavor and aroma profile, making it an innovative product in the craft bread category.

Table 7

Recipe 2 for «Gluten-free bread with quinoa, chia seeds and buckwheat flour»

Ingredient	Weight, g (per 400 g)	Humidity, %	Dry matter content, kg	Weight, g (per 600 g)	Humidity, %	Dry matter content, kg
Buckwheat flour	150	10	0,135	225	10	0,203
Quinoa flour	100	10	0,090	150	10	0,135
Chia seeds	20	10	0,018	30	10	0,027
Flax flour	10	10	0,009	15	10	0,014
Psyllium	10	10	0,009	15	10	0,014
Coconut oil	15	0	0,015	22	0	0,022
Sea salt	5	0	0,005	8	0	0,008
Purified water	85	100	0,085	130	100	0,130
Total weight	400	-	-	600	-	-

Developed by the authors

Table 8

Recipe 3 for «Sourdough Bread with Lavender, Honey and Dried Apricots»

Ingredient	Weight, g (per 300 g)	Humidity, %	Dry matter content, kg	Weight, g (per 600 g)	Humidity, %	Dry matter content, kg
Premium wheat flour	150	14	0,1290	300.00	14	0,2580
Purified water	90	100	0,0000	180.00	100	0,0000
Natural sourdough	25	65	0,0088	50.00	65	0,0175
Natural honey	10	18	0,0082	20.00	18	0,0164
Dried apricots	15	20	0,0120	30.00	20	0,0240
Dried lavender	1,7	10	0,0015	3.33	10	0,0030
Grape seed oil	5	0	0,0050	10.00	0	0,0100
Sea salt	2,50	0	0,0025	5.00	0	0,0050
Vanilla extract	0,83	50	0,0004	1.67	50	0,0008
Total weight	300	-	-	600	-	-

Developed by the authors

3. Development of craft bread technology

For the craft production of such innovative breads as «Whole grain bread with flax, sunflower, pumpkin and tomato seeds», «Gluten-free bread with quinoa, chia seeds and buckwheat flour», «Sourdough bread with lavender, honey and dried apricots» an unconventional composition of products will be required.

Non-traditional products include both basic and additional ingredients that provide the unique taste, texture, and nutritional value of each type of bread. In particular, whole grain bread uses whole wheat flour, natural wheat sourdough, dried tomatoes, flax, sunflower, and pumpkin seeds, which give the product a rich flavor and additional nutritional value.

Gluten-free bread is made from buckwheat flour, flaxseed flour, quinoa flour, and chia seeds, which serve as a natural thickener and source of Omega-3.

For sourdough bread, wheat flour, natural sourdough, dried apricots, lavender, and honey are used, which create an exquisite aroma and a sweet note in the taste. This combination of ingredients not only ensures a high-quality result, but also emphasizes the author's approach to craft bread baking.

So, high-grade wheat flour is the most common in the baking industry. It has a white or cream color, fine grinding, and low ash content (0.45–0.55%). Its main technological advantage is the high content and quality of gluten (25–30%), which ensures good dough elasticity, high gas-forming and gas-retaining capacity. Wheat flour has a dough strength of W = 250–350 units, which allows for the production of products with a large volume and a good porous structure. Its moisture absorption capacity is 55–58%, which contributes to the formation of medium-density dough.

Whole wheat flour is made from the entire grain, including the bran and germ, and therefore has a higher ash content (1.2–1.8%) and a darker color. It is medium or coarsely ground. The gluten content is somewhat lower and its quality is reduced due to the presence of bran. The moisture absorption capacity is increased by 60-65%, which is due to the presence of fiber. The gas-forming and gas-retaining capacity is lower than that of higher-grade flour, so it is usually mixed with high-grade flour to improve technological performance. Dough based on this flour has average lifting power, takes longer to ferment, but has high nutritional value.

Buckwheat flour has a grayish-brown color, medium grinding and a characteristic nutty aroma. It does not contain gluten, so it cannot form a dough with good structural properties on its own. Its moisture absorption capacity is 65-70%. Due to the lack of gluten, it has low gas-forming and gas-retaining properties. It is often used in a mixture with wheat flour. Gives baked goods a darker color, a pronounced flavor, and high nutritional value.

Quinoa flour has a light yellow color and a pleasant nutty-earthy taste. Like buckwheat, it does not contain gluten, so it is not able to form elastic gluten. Its moisture absorption capacity is quite high – 65-68%. Used in gluten-free baking or in combination with other types of flour. Gas-forming and gas-retaining capacity is low, so the dough structure is crumbly. Quinoa flour is rich in protein, fiber and minerals.

Flaxseed flour has a dark brown color, very fine grinding and a pronounced nutty aroma. Its feature is an extremely high moisture absorption capacity – 90-110%, due to the content of soluble fibers and mucilages. Flaxseed flour does not contain gluten, so it does not form the structure of the dough on its own, but can act as a thickener or egg substitute. It has no gas-forming ability. It is added in small amounts (up to 10-20%) to other types of flour to increase nutritional value, enrich with Omega-3 fatty acids, and improve moisture retention in products.

The research process took into account temperature regimes, duration of technological operations, humidity level (if necessary), and other important features of dough preparation and baking. Such a comprehensive approach provides the opportunity to compare technologies, identify critical factors that affect the quality of the final product, and maintain optimal conditions for the production of each type of bread.

The analysis of the parameters of technological operations for three types of bread is presented in Table 9.

Table 9

Analysis of parameters of technological operations of craft bread

Bread name	Operation	Temperature, °C	Time	Additional parameters
Whole grain bread with flax, sunflower, pumpkin and tomato seeds	Sifting flour	-	-	Improves dough texture
	Seed preparation (flax grinding)	-	-	The seeds are crushed for better absorption
	Grinding dried tomatoes	-	-	Tomatoes cut into small pieces
	Activating the starter	22-26	30-40 min	Room temperature water to activate the starter
	Dough Kneading	-	10-15 min	Soft, elastic dough, does not stick to hands
	Fermentation	22-26	1,5-2 hours	Cover the dough with a towel, knead 1-2 times
	Forming and rising	22-26	30-40 min	At room temperature
	Baking	220	35-40 min	Steam oven for crispy crust
	Cooling	20–25	30 min	On a wire rack after baking until completely cooled

Continuation of table 9

Gluten-free bread with quinoa, chia seeds, and buckwheat flour	Mixing dry ingredients	-	-	Mix thoroughly for even distribution
	Combining with liquid ingredients	-	-	Room temperature water, melt oil
	Proving	-	30-40 min	In a warm place, bread rises slightly
	Baking	180	40-50 min	Cover with foil if top starts to burn
	Cooling	20-25 °C	1 hours	On a wire rack after baking until completely cool
Sourdough bread with lavender, honey and dried apricots	Flour sifting	-	-	Determines the texture of the dough
	Sourdough activation	24-26	4-6 hours	Water temperature 22-26°C
	Autolysis	24-26	30 min	90% water is added to the flour to form hydration
	Dough kneading	24-26	10-15 min	Moderately elastic dough, honey and other ingredients are added
	Fermentation	24-26	3-4 hours	2–3 passes with an interval of 45-60 min
	Proving	20-22	2-2,5 hours	or 8-12 hours in the refrigerator
	Baking	230-240	30-35 min	First 10 min with steam, then 20-25 min at 200-210°C
	Cooling	20-25	1–2 hours	On a wire rack after baking until completely cooled

Developed by the authors

A comparison of technological operations shows that each type of bread has its own specifics of preparation. For example, gluten-free bread requires longer cooling to stabilize the structure, while sourdough bread requires prolonged fermentation and controlled proofing, which can last up to 12 hours in the cold. Whole grain bread with seeds requires less fermentation time, but careful preparation of the ingredients (grinding, soaking, etc.) is important.

Maintaining the appropriate temperatures, times and sequence of operations are critical to producing quality bread with the desired texture, aroma and taste characteristics. The final cooling stage at 20-25°C ensures crumb structure stabilization and crust preservation.

The technology for making bakery products consists of several consecutive stages: preparation of sourdough starters and doughs with long fermentation (12-18 hours), kneading the dough by hand or in a mixer, shaping the products in accordance with the craft approach, proofing in controlled conditions, baking in combi steamers or stone ovens depending on the recipe. After baking, the products are cooled and packed in environmentally friendly craft packaging with branded labels. All production operations are accompanied by log keeping, the HACCP system has been implemented for critical point analysis, and the residue of raw materials and finished products is monitored.

In order to assess the nutritional value of innovative types of craft bread, an analysis of their physicochemical composition was conducted. Table 10 shows data on the content of basic macronutrients (proteins, fats, carbohydrates) and energy value per 100 grams of product.

Table 10

Physico-chemical composition of innovative craft bread, per 100 g

Nutrient	Indicator		
	Whole grain bread with flax, sunflower, pumpkin and tomato seeds	**Gluten-free bread with quinoa, chia seeds, and buckwheat flour**	**Sourdough bread with lavender, honey and dried apricots**
Proteins, g	8,03	9,37	4,7
Fats, g	10,53	7,78	2,2
Carbohydrates, g	33,16	43,68	36,3
Energy value, kcal	261,25	281,00	180,6

Developed by the authors

Each type of innovative craft bread has clear quality requirements, including appearance, color, texture, taste, and aroma. Since each bread has its own unique characteristics, it is important to adhere to technological requirements and standards to achieve the desired result in each category.

Table 11 describes the main criteria that determine the quality of bread, in particular for whole grain bread, gluten-free bread and sourdough bread with lavender and honey. This will help not only to ensure high quality products, but also to improve product recipes and technology, meeting consumer needs.

Technological requirements for each type of bread are aimed at ensuring high quality of the finished product, which will satisfy consumer requirements in terms of both taste and organoleptic characteristics.

Table 11

Quality requirements for innovative craft bread

Indicators	Whole grain bread with flax, sunflower, pumpkin and tomato seeds	Gluten-free bread with quinoa, chia seeds, and buckwheat flour	Sourdough bread with lavender, honey and dried apricots
Appearance	Evenly baked golden brown crust without cracks, with visible flax, sunflower, pumpkin seeds and pieces of dried tomatoes	Rectangular or round shape, smooth, evenly browned, golden brown crust without burnt areas	The loaf has the correct shape, an even, well-baked crust without cracks or carbon deposits
Color	The crust is golden brown, the crumb is beige or light brown.	The crust is golden brown, the crumb is light brown or grayish, uniform with seed inclusions. The texture is dense, moist, elastic without stickiness, evenly baked, fine or medium porosity.	The crust is golden brown, the crumb is light beige with specks of dried apricots and lavender.
Texture	The crumb is porous, soft, elastic, does not crumble when cut, is not dense or dry.	The crust is golden brown, the crumb is light brown or grayish, uniform with seed inclusions. The texture is dense, moist, elastic without stickiness, evenly baked, fine or medium porosity.	The crumb is elastic, evenly porous, not sticky, tender and springy.
Taste	Nutty flavor with sourdough sourdough and a light hint of tomatoes.	The taste is pleasant, typical of gluten-free baking with nutty notes from buckwheat, quinoa, chia and flax.	Moderately sweet taste with a slight sourness.
Aroma	The aroma of freshly baked bread with olive oil and a light smell of fermentation.	The aroma is pleasant, with nutty notes (from buckwheat, quinoa, chia, flax).	The aroma is distinct with notes of sourdough, lavender and honey.

Developed by the authors

CONCLUSIONS

The developed recipes for three types of bread are based on the principles of naturalness and innovation, using unique combinations of ingredients (whole grain wheat flour, quinoa flour, buckwheat flour, chia seeds, lavender, dried apricots). The production involves the use of natural sourdough and long

fermentation (18–24 hours), which provides a deep taste and improves the properties of the bread. Each recipe is detailed, taking into account the mass of components, their moisture content and dry matter content, which guarantees stable product quality.

Technological maps and recipes have been drawn up for the three types of craft bread developed, they have been introduced into production in the bakery and can be recommended for consumption by all segments of the population to improve their diets.

SUMMARY

Development of new types of bread using non-traditional grains (e.g. spelt, quinoa, amaranth), starter cultures with probiotic properties, functional additives (seeds, spices, vegetables, superfoods) and modern technologies (low-temperature fermentation, gluten-free production) allows you to satisfy the growing demand for healthy food, expands the range of products and at the same time is relevant for the development of the restaurant industry, craft production and the country's food industry.

Craft bread differs significantly from industrial bread in terms of the method of production, the quality of ingredients, the duration of fermentation, the taste characteristics, and the general philosophy of production. It is prepared by hand or with minimal use of machinery, focusing on the baker's skill and individual approach.

One of the important aspects of bread production is the fermentation process. In craft baking, the dough ripens slowly – up to 24 hours, which gives it a deep taste, a distinct aroma and facilitates digestion. The sourdough contains beneficial bacteria that support the intestinal microflora, improve digestion and help maintain a healthy stomach.

Superfoods are actively integrated into bread production: spirulina, amaranth, chia seeds, sea buckthorn, activated carbon, which form bread as a functional product with high health potential. Expansion of the line of gluten-free products based on pseudocereals (buckwheat, chickpeas, corn, flax) is a response to the growing demand from people with gluten intolerance.

The paper considers the issue of developing recipes and technologies for craft bread for sale in a bakery, focusing on the needs of different consumers. The first type of craft bread is whole grain bread with flax seeds, sunflower, pumpkin and tomatoes; the second – gluten-free bread with quinoa, chia seeds and buckwheat flour, will be an excellent choice for those with gluten intolerance; the third – sourdough, with lavender, honey and dried apricots, is positioned as a premium product due to its exclusive ingredients.

In the process of creating craft bread, temperature regimes, duration of technological operations, humidity level, and other important features of dough preparation and baking are taken into account. Such a comprehensive approach provides the opportunity to compare technologies, identify critical factors that affect the quality of the final product, and maintain optimal conditions for the production of each type of bread.

The technology for making bakery products consists of several consecutive stages: preparation of sourdough starters and doughs with long fermentation (12-18 hours), kneading the dough by hand or in a mixer, shaping the products in accordance with the craft approach, proofing under controlled conditions, baking in combi steamers or stone ovens, depending on the recipe.

The studied bread has certain physicochemical indicators, but differs in that it does not contain flour improvers, preservatives, or flavor enhancers, which makes its shelf life shorter than industrial types of bread.

For each type of innovative craft bread, clear quality requirements are set, including appearance, color, texture, taste and aroma, as each bread has its own unique characteristics.

The target audience for consuming craft bread is people who follow a healthy lifestyle and have dietary restrictions (celiac disease, veganism, diabetes), as well as gourmets and young families who value quality and uniqueness in nutrition.

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Information about the authors:
Medvedieva Anzhelika Oleksandrivna,
Candidate of Technical Sciences,
Associate Professor at the Restaurant and Craft Technologies,
State University of Trade and Economics,
19, Kioto str. Kyiv, 02156, Ukraine

Antoniuk Iryna Yuriivna,
Candidate of Technical Sciences,
Associate Professor at the Restaurant and Craft Technologies,
State University of Trade and Economics,
19, Kioto str. Kyiv, 02156, Ukraine