

PROSPECTS OF USING FREEZING DOUGH SEMI-FINISHED PRODUCTS TECHNOLOGY IN RESTAURANT BUSINESS

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Abstract

The article studies the application of the quick freezing dough semi-finished products technology in restaurant business. The advantages of using frozen dough pieces in the production of the bakery products in comparison with traditional technologies are analyzed. The advantage of the freezing method over other ways of preservation is proved. Technological modifications of such method are presented. The analysis of the existing freezing methods has shown a topicality of using aerial method of low-temperature processing of the dough semi-finished products.

Key words: technology, freezing, dough, semi-finished products.

I. Introduction

Modern development of restaurant business in the world is characterized by the introduction of intensive technologies. One of such technologies is the preparation of the bakery products using frozen semi-finished products [4; 5; 7].

At present the technology of quick freezing is widespread. It allows to respond quickly to market needs in providing the consumers with the products of restaurant industry in a wide assortment, to reduce the cost of their transportation, to control centrally the quality and safety of the bakery products at the stage of the preparation of the semi-finished products, to expand the network of the implementation due to the creation of the mini-bakeries with incomplete technological cycle [2; 6; 9].

The advantages of the application of the frozen dough pieces in the production of the bakery products are obvious. They are the possibility to use quick frozen semi-finished products in the system of fast food; the reduction of the cost of qualifying labour and production spaces; the flexibility of the technological process; the preservation of the finished products freshness to the moment of their realization; long terms of the dough semi-finished products storage; a significant expansion of the assortment; the opportunity to transport frozen semi-finished products over long distances.

In modern conditions the production of high-quality bakery products with long terms of their storage gains more and more importance. One way of solving this task is their freezing [12].

Its advantage over other methods of preservation is that freezing encourages better preservation of the initial properties of the bakery products (color, smell, and crumb structure), and inhibition of the microbial growth. The main condition of this technology is to preserve the quality of the product.

As a way to preserve the freshness of the bakery products, a freezing process has undergone several technological modifications.

In the early stages of the development of this technology fully prepared bakery products were frozen and delivered to customers in the frozen or defrozed forms. Currently the modification of this technology is used. That is the production of underbaked products that are ready just before their transportation or are sold in the final baking items where they are baked until cooked: institutions of restaurant business, mini-bakeries, supermarkets or for home baking.

One of the ways, which is now widely used, includes the preparation of the frozen dough for different bakery and pastry products in the storing enterprises that specialize in producing these types of the products. This method of frozen dough realization has a clear advantage because it allows to produce freshly baked bun

goods which are relevant to traditionally manufacturing finished products, including organoleptic and physico-chemical characteristics.

This method is applied not only to freeze the dough, but for non-yeast, mellowed by chemical methods dough which is used for the production of cookies, cakes and other bakery and pastry products. The market of such goods is smaller than of the yeast dough.

The applicability and technological variety of frozen dough preparation are determined by economic, marketing and production factors, as well as the demands of the production quality that differ in different countries. This technology is affected by the market size, the need for long-term storage of the products and the length of the delivery routes. Achieving a stability of the dough during its prolonged storage in a frozen state is the most important factor [12].

At present frozen semi-finished products industry is characterized by the promising prospects of the growth due to appearing in new markets. Due to the technological improvements one can assume that economy will dictate a high degree of industry consolidation. This trend will undoubtedly put pressure on the independent producers, regional supermarkets and chains of the restaurants, forcing them to consolidate their work to remain competitive.

Different methods of preservation are used when there is a production necessity of the semi-finished products storage over certain period of time [1].

Here are the main advantages and disadvantages of the different methods of preservation of the semi-finished bakery products.

In the practice of global bakery production there is a well-known method of the yeast semi-finished products preservation by cooking them at low temperatures (- 18 -- 20° C) to inhibit their fermentation.

In the foreign and native practices of the enterprises that specialize in such technologies, accelerated methods of cooking the dough are used with its intensive

kneading in the high-speed kneading machines applying artificial cold to prevent excessive semi-finished products heating, because it leads to a deterioration of the structural and mechanical properties of the dough and the quality of the finished products.

Semi-finished dough products can be chilled by three ways: by injecting solid carbon dioxide, by adding flake ice instead of water and by using the shirts that are cooled in the kneading machines.

Special camera-inhibitors are used to slow the fermentation process of the dough of wheat flour. A cooling process of the semi-finished products in the camera-inhibitors is carried out at -5°C , and a stopping process of freezing is conducted at lower temperatures ($-18 \dots -19^{\circ}\text{C}$). Chilled dough (with slow fermentation process) is recommended to keep no more than 3 days, further storage of the dough leads to the decomposition of its protein-proteinased complex and as a result to the deterioration of the finished product quality. Chilled semi-finished products can be used in any way in cooking the dough, the quality of the finished products remains at a high level.

Freezing cabinets and cameras without circulation or with air circulation are usually used in the procuring enterprises with small capacity. Freezing at temperatures $-20 \dots -30^{\circ}\text{C}$ and with different aerial speeds is practised [10].

Research shows that bakery products stale quickly in the temperature range $21 \dots -7^{\circ}\text{C}$, so overcoming this temperature range in the shortest time enables to preserve the freshness of the finished products better. In respect of this, quick freezing of the bakery products has an advantage over slow one. The quality of the fast freezing products after defrosting them is higher than the slow ones [6].

In the world practice a wide range of the freezing methods and corresponding to them technical means are used for quick freezing of the bakery products.

II. Task Setting

The objective of the article is to determine the prospects of the application of the quick freezing dough semi-finished products technology in restaurant business.

To determine the objective the following tasks are formulated:

1. to analyze the existing methods of freezing with the determination of their advantages and disadvantages.
2. to indicate the purposefulness of bakery production using frozen dough and its usage in a network of the restaurants.

III. Results.

The freezing methods are conventionally divided into three main groups:

1. Usage of the secondary environment (coolant), which is cooled by a cooling agent in the special heat exchangers;
2. Direct contact of the product with a cooling agent through a metal surface.
3. Direct contact of the food product with a cooling agent.

The first group of the methods provides the liquid and gaseous coolants. In case of using the liquid coolants (the solutions of calcium chloride and sodium, propylene glycol, etc.) a submerged method of freezing is applied, in case of the gaseous coolants – an aerial method. In the bakery industry of CIS an aerial method of the freezing dough semi-finished products is most widespread as the least energy-consuming process [11].

Freezing by submerging in the non-boiling liquid was investigated in XIX century. But in details it is studied since the 1930s. This freezing (cooling) method cannot be used for the production of the bakery products. Cold solutions of salts, mainly sodium chloride, calcium chloride, propylene glycol, ethanol and others, are applied as the non-boiling liquid. Its main disadvantage is the penetration of salt into the product.

The second group is formed by the methods based on the contact of the product and coolant through a metal surface. They are mainly used for the products with a proper geometric form.

Freezing methods of the third group, using liquid, solid and gaseous coolants, are united by a common name – cryogenic.

Cryogenic freezing, which refers to the first method, is a widespread way of the preservation of the semi-finished bakery products, particularly of wheat flour sorted grinds. This trend is intensively developed in many countries of the world, the leaders among which are: Japan, Germany, USA, Canada, Holland, Italy and others [13, 14, 15].

In recent decades, the bakery industry of CIS uses the achievements of cryogenic technologies in the production of bakery products. An application of artificial freezing significantly expands the frames of the well-known methods of the dough preparation.

At present the following cryogenic agents are applied in the production of freezing food products: liquid nitrogen, carbon dioxide, and freons (fluorinechlorinehydrocarbohydrate, fluorinehydrocarbohydrate, and cryogenic liquid).

Liquid nitrogen is the most popular for freezing food products which is characterized by the relative inertia, low temperature and the ability to absorb large amounts of heat per unit mass.

A cryogenic freezing method with the usage of carbon dioxide has attracted the specialists' attention long since. A freezing process is conducted by affecting on the product with cold gas and liquid medium or by creating a mixture of gas and solid carbon dioxide that disperses in it. Dioxide hydrocarbon can also be used for contact freezing almost of any food products, as it has antibacterial properties and allows to receive a small percentage of shrinking (1.0 - 0.5%) of the frozen product.

However, the main disadvantage of this method is a high cost of the cryogenic coolants.

The submerged and aerial methods of freezing are widespread in many countries of the world.

The freezing speed in the aerial environment depends on the size of the product, environmental temperature and the speed of its circulation. In the foreign and national practices the freezing process of the semi-finished bakery products is done in the temperature range $-18 \dots -40^{\circ} \text{C}$ depending on the recipe of a product and an expiry date of the quick frozen semi-finished products [8].

Bakery products are frozen when they are cooled. It is known that at 25°C the products stale quickly. However, it is proved that the bakery products, frozen without cooling (with the temperature of the crumb not higher than 40°C), are characterized by better properties of the crumb which remains softer after it is defrozen [3].

A well-known method of the freezing bakery products at one stage: chilled to $30 - 40^{\circ} \text{C}$ the bakery products are placed in a refrigerator at the atmospheric temperature -30°C , and they are frozen until the temperature of the crumb reaches its final degree. Using this method the duration of the process in practical terms depending on the weight of the product is 6–8 hours, during this time the bakery products begin to stale [9].

The success of the frozen semi-finished bakery products reflects the cost of amenities and highlights two major problems that face the procuring enterprises: the need to compete by expanding the scope of the production and the need to confront the situation that becomes worse in the labour market [7].

Frozen dough semi-finished products are mainly sold through the chain of restaurant institutions and a network of retail.

Fast growing popularity of the frozen dough semi finished products for the bakery production was largely caused by the economic attractiveness of centralized production and marketing.

Fast food chain and bakeries with shops being served by one bakery is more economical option than when every commercial establishment has its bakery.

Comparing different costs associated with ordering, storage, weighing and checking the quality of many ingredients (including quickly spoilt ones) that inevitably occur when baking the products with the simplicity of the principle “defreeze and sell”, many retailers begin to understand the appeal of the frozen semi-finished bakery products. Defrozen and then baked goods lose to freshly baked products of initial raw materials, but are equal to them in flavor and taste, and do not need the cost for the production of the freshly baked products [8].

Now technology of the frozen semi-finished products is characterized by the promising prospects of the growth due to its introduction into new markets. With the improvement of freezing methods it is expected that the economy will dictate a high degree of industry consolidation. This trend will affect independent producers, regional supermarkets and chains of the institutions of restaurants business, forcing them to change their job to remain competitive.

IV. Conclusions

The analysis of the existing freezing methods has shown a topicality of using an aerial method of low-temperature processing of the dough semi-finished products.

A topicality of the frozen semi-finished bakery production is firstly determined by the economic reasons. General economic and demographic evolution of the system of restaurant business and bakery production in stores provides a solid foundation for the growth of the frozen semi-finished production for the coming years. Regardless of the method of the implementation (through the restaurant industry or retail system) frozen semi-finished bakery products is an important component of achieving effectiveness of the costs in an increasingly competitive,

fragmented market and enlarging labour costs. The quality of these products will improve with time.

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