

## QUALITATIVE ANALYSIS OF SOME TYPES OF BREAD

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### ABSTRACT

*Knowing the behavior of the dough is useful and necessary in the industry for the evaluation of the technological and functional parameters of the equipment that processes the dough as well as the establishment of the technological parameters of the bread manufacturing process. Starting from these specifications, the theme addressed in this study refers to the formation and qualitative behavior of the assortment of bread with potatoes compared to an assortment of white bread on the market. In this sense, qualitative aspects encountered during the process of obtaining and preserving the varieties of bread under study are followed: industrial white bread and industrial white bread with potatoes, made according to a traditional method. After obtaining, the samples of bread formed in the laboratory are analyzed chemically (determination of acidity and ash).*

### INTRODUCTION

The bakery products currently obtained on an industrial scale present a great diversity, for each one applying the appropriate technological process, which includes a set of phases and operations following which the raw materials used in the manufacture are transformed into the finished product (Swyngendau et al. 1991, Banu 1999, Voicu 1999, Dogaru et al. 2004).

Important research shows the nutritiv value of potato used in various forms (mashed, potato juice, potato flour, etc.) in innovative technologies for obtaining bread (Iancu et al. 2010, Husby et al. 2012, Gumul et al. 2017, Gumul et al. 2020). Potato pulp, the second by-product formed during the manufacture of potato starch, is also produced in large quantities, even exceeding the above mentioned numbers for potato-juice (Yang et al. 2018). Potato pulp is a heterogeneous mixture of many components, in which fiber is accompanied by proteins, little amount of fat, minerals and nitrogen-free extract Attention should be given to protein of high biological value, which contains high levels of essential amino acids, and therefore is complete (similarly to egg white and animal proteins), and lipids with a significant proportion of polyunsaturated acids (linoleic and linolenic acids). The mechanical action exerted on the dough during modeling is an extension of the mechanical action of kneading. As a result, the transformations undergone by the proteins evolve, finalizing the three-dimensional structure of the dough, which leads to the improvement of its rheological properties and the quality of the bread (Peřsa et al. 2013). For this, however, it is necessary that the mechanical action exerted on the dough is

sufficiently intense. An insufficient or excessively intense mechanical action leads to obtaining products of lower quality; in the first case the dough reaches the maximum potential of its rheological properties, and in the second case the gluten skeleton is destroyed (Belderok 2000, Scanlon and Zghal 2001). As well as the duration of fermentation, leavening as well as the duration and method of baking are the parameters that can influence the quality of the finished product (Rosell et al. 2007, Mais et al. 2008). The new technology allows taking over production peaks, thus ensuring its fluency, as well as the possibility of selling the products at the place of their production (Guthman 2008). In the bakery industry, the innovative aspect appears, the prospective development of the bakery industry aims to obtain quality products increasingly demanded by consumers in accordance with the more and more laborious specific tastes and local tradition (Săseanu 2005, Bobrow et al. 2008, Căpruciu 2013, Sleeter 2022).

## **MATERIAL AND METHODS**

Two bread samples were taken for the study: white bread with potatoes and classic white bread in order to carry out a comparative qualitative study. The verification was carried out on a sample of 10 breads from each bread specialty taken at random from different parts of the batch.

The acidity was determined titrimetrically. The aqueous extract of the sample to be analyzed is titrated with 0.1 n sodium hydroxide solution in the presence of phenolphthalein, as an indicator. Materials and equipment used: sample to be analyzed, 500 cm<sup>3</sup> glass flask with ground stopper, technical balance, weights kit, weighing capsule, Erlenmeyer beaker, rod, funnel, Berzelius beaker, filter paper, burette, pipette, NaOH solution 0.1 n, graduated cylinder, phenolphthalein solution 1% in ethyl alcohol 70% vol. Total acidity was expressed in malic acid. As a result, the arithmetic mean of two determinations performed in parallel that did not differ by more than 2% (in relative value) from the mean was taken. The obtained result was expressed with a decimal.

Ash determination was performed by slow calcination at 550-650°C for 16 hours followed by separation of mineral substances in 3n hydrochloric acid. Required equipment: temperature-adjustable electric oven. Reagents: hydrochloric acid 1+3, argist nitrate, 0.1% solution. 5 g are weighed from the sample, with a precision of 0.001g and introduced into a flat-bottomed porcelain crucible of 50 cm<sup>3</sup>, previously calcined at a temperature of 750±25°C, until the constant mass, weighed with a precision of 0, 0001g. The resulting ash content was expressed in %.

## **RESULTS AND DISCUSSIONS**

Given that bread is a basic food in the human diet, obtained by baking a dough formed by several innovative techniques, a thorough and rigorous research is required to establish the quality properties of the finished product. The use of different types of dough, with additions of secondary meats, including potato, becomes a necessity due to the growing demand in our country for bakery products, but especially for white bread. In order to obtain the assortments of bread chosen for this study (white bread and white bread with potatoes), a scheme for their manufacture, technological calculations and the calculation of the framework recipe were carried out. In order to realize the technological scheme for obtaining white bread with potatoes, the specific consumptions for 1 kg of finished product consisted of: superior white flour 000 (type 650) - 0.500 kg; yeast – 0.008 kg; iodized salt - 0.008 kg; sugar - 0.010 kg; sunflower oil – 0.045 l; water – 0.225 l; mashed potatoes

- 0.175 kg; powdered milk - 0.010 kg. The amounts of raw and auxiliary materials for a batch of dough obtained from 100 kg of flour are: 1,600 kg of yeast; 1,600 kg of iodized salt; 2 kg of sugar; 9 l of sunflower oil; 35 kg of mashed potatoes; 2 l water. Starting from these calculations, the framework recipe for the assortment of bread with potatoes adapted for the weight of 1 kg/piece is given in table 1.

The raw and auxiliary materials have a well-defined role in the manufacture of this assortment, through their composition ensuring a certain content of valuable substances from the point of view of food, taste and aroma, and through the technological properties they have, they influence the development of the technological process.

Table 1

Raw and auxiliary materials used in the preparation of potato bread assortments

Raw and auxiliary materials	Quantities for a 10 kg batch of flour (minimum 13.5 kg of product)		
		From which	
		mayo	dough
White wheat flour, kg	10,0	5,0	5,0
Compressed yeast, kg	0,4	0,4	
Salt, kg	0,13	-	0,13
Sugar, kg	0,15	-	0,15
Water, l, approximate	6,3	2,0	4,3
Mashed potatoes (Kg)	1	-	1

Regarding the addition of mashed potatoes in the amount of 1 kg added completely to the dough during the kneading phase in order to incorporate it well. It should be noted that the temperature of the mash when added is 30°C, with the aim of maintaining the activation of the yeast.

A higher temperature would lead to the inactivation of the yeast resulting in a flattened, shapeless bread with a weak smell, uncharacteristic of the varieties of bread studied. It is also noticeable that the amount of yeast has doubled in the case of the potato bread assortment.

The manufacturing recipe for the white bread assortment is based on the following ingredients in Kg (white wheat flour; compressed yeast; salt; sugar; water). To make a dough from 10 kg of flour, the following were used: compressed yeast: 0.2 kg in the form of yeast, high-purity iodized salt 0.13 kg per 10 kg of flour; sugar 0.15 kg used in the mayo for quick activation of the yeast; water: 6.3 l used for the preparation of leaven in a quantity of 2 l, the remaining 4.3 l being added in the process of kneading the dough (Table 2). Similar research was carried out by Ahrné et al. in 2007. Part of the amount of water was used in the formation of yeast. The water temperature used for the mayo was 30°C. For the water added to the dough, the temperature was 25°C.

Table 2

## Raw and auxiliary materials used in the preparation of white bread assortments

Materii prime și auxiliare	Quantities for a 10 kg batch of flour (minimum 13.5 kg of product)		
		From which	
		maia	aluat
White wheat flour, kg	10.0	5.0	5.0
Compressed yeast, kg	0.2	0.2	
Salt, kg	0.13	-	0.13
Sugar, kg	0.15	-	0.15
Water, l, approximate	6.3	2.0	4.3

The same procedure was used to make both varieties of bread. The direct (monophasic) method was used to prepare the dough. The direct method consisted in preparing the dough in a single phase using all the mentioned raw materials and auxiliary materials (Table 3) at the same time, this method being considered by specialists to be the simplest and fastest method of preparing the dough.

Table 3

### Analysis of manufacturing parameters for white bread and potato bread

Obtaining parameters	Assortment of industrial bread		Observations
	Bread with potatoes	White bread	
	The direct method		
Duration of kneading (minutes)	15	10	-
Duration of fermentation (minutes)	90	60	Direct method - in an environment with a temperature of 30...32°C (in the kneading bowl)
Duration of final fermentation (minutes)	30	15	Direct method - in an environment with a temperature of 35...40°C (in Teflon molds greased with sunflower vegetable oil)
Baking time (minutes)	80	60	In a brick oven
Cooldown time (hours)	3.5	3	At room temperature

Through this method, the dough was classically kneaded (manually) for 10 minutes to obtain white bread and 15 minutes to knead bread with potatoes, after which it is fermented for 90 minutes and 140 minutes respectively at a temperature of 30-32°C, using yeast under form of maya. The duration of fermentation in the case of dough with mashed potatoes is longer compared to classic dough.

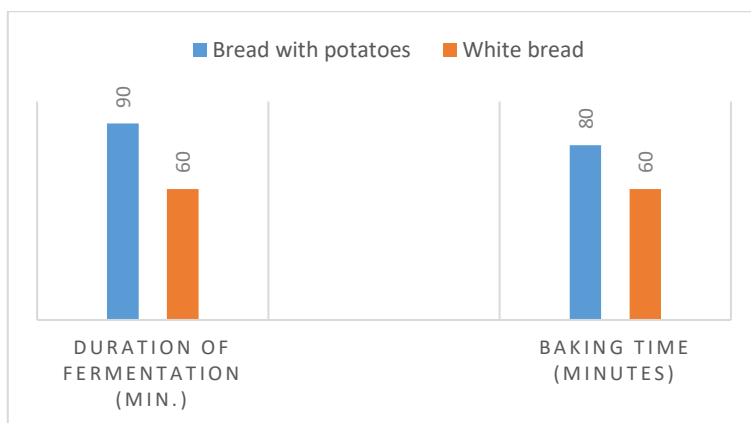


Figure 1. Analysis of fermentation duration and ripening

It can also be seen that baking is negatively influenced for white bread with potatoes, the time being longer.

## CONCLUSIONS

The analyzed quality characteristics highlight a quality flour that lends itself to the bakery industry; From the point of view of the degree of freshness, the varieties of bread obtained by the direct method get old quickly; After baking, a greater increase in volume was found for bread obtained from mechanically processed dough.

The use of potatoes in the form of puree in the kneaded dough led to the smooth development of the fermentation process, helping, in addition to the other technological elements, to shorten the manufacturing time; Consuming bread enriched with potatoes increases the nutritional value of this bread assortment.

The direct method of obtaining white bread led to the obtaining of attractive products, increased in volume, with appropriate porosity and elasticity, but without the characteristic aroma and taste of baked bread. In the case of potato bread, the volume is more flattened, with dense porosity, with medium elasticity. Compared to white bread, white bread with potatoes presented a special aroma and intense taste.

The use of the classic, direct method (kneading by hand) leads to obtaining bread assortments with a pleasant appearance, with a normal increase in volume (less than white bread with potatoes) but with a perfect taste, aroma and smell of hearth-baked bread.

As a result, following the qualitative analysis, it can be said that both types of bread analyzed are qualitatively compliant, being recommended for daily consumption. The white bread with potatoes stands out for its higher nutritional intake and is complemented by a bouquet of aroma and taste that ennobles the taste buds.

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