JOURNAL OF BAKU ENGINEERING UNIVERSITY- MECHANICAL AND INDUSTRIAL ENGINEERING
2024. Volume 8, Number 1 Pages 22-25

UOT: 664.045
DOİ: https://doi.org/10.30546/09085.2024.106.114

DOUGH USED IN THE NATIONAL CUISINE OF AZERBAIJAN STUDY OF RHEOLOGICAL PROPERTIES OF SEMI-TREATMENT

AKHMED MELIKOV

Azerbaijan State Agrarian University

axmed_melikov@mail.ru

ARTICLE INFO

Article history:
Received: 2024-10-23
Received in revised form: 2024-10-23
Accepted: 2024-10-30
Available online

Keywords:
dough,
semi-finished product,
moulding,
rheology,
elastic recovery coefficient

ABSTRACT

The article examines some rheological properties of a semi-finished dough product, including the property of elastic recovery of the dough and density changes depending on pressure, in order to determine the technological and design parameters of the rollout during the formation of the dough.
The change in the elastic-reducing properties of the dumpling dough at different design parameters of the rolling machine and at different dough humidity (W = 45-50%) and the change in dough density depending on pressure were experimentally studied.
The study's purpose is to ensure the high quality of the semi-finished study's purpose is to ensure the high quality of the semi-finished product by conducting the moulding process in an optimal mode.

INTRODUCTION

The result of the analytical study shows that lavash, juha, noodles, hangel, dushbara, etc. are typical for our national cuisine. in its preparation, semi-finished dough of various thicknesses is used. Depending on the purpose, the thickness of the mentioned test semi-finished products may be in the range of 0.5-1.5 mm. In most products, the dough is formed by rolling out semi-finished products. The coefficient of elastic recovery of the mechanically acting dough mass is one of the main parameters required in the report of dough forming machines. In this regard, the coefficient of elastic recovery of the dough varies depending on the humidity of the dough, its temperature, the duration of mechanical action, the number of repeated rolls and the distance between the shafts [1,3,4,6].

The purpose of the study

The purpose of the study is to ensure the high quality of the semi-finished product by carrying out the machine molding process of semi-finished dough products used in our national cuisine in an optimal mode.

The method of experiments.

For an experimental study of the elastic recovery properties of the dough, a dough rolling device consisting of two rolling shafts was used (fig. 1). The device provides the possibility of adjusting the gap between the shafts within 0.5...20 mm. The rotation speed of the spreading shafts was 100...120 rpm. The thickness of the test sample at the initial stage and after molding is recorded by measuring with a micrometer. The experiment was carried out on semi-finished products of dushbara and hangal dough (dough humidity 45-50%)..

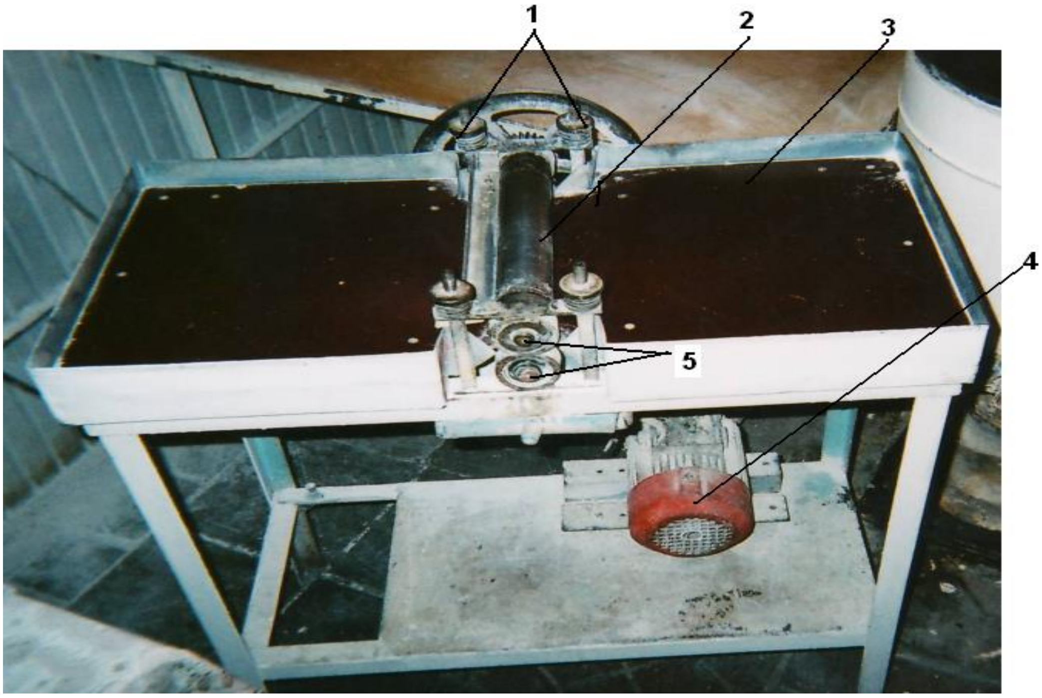

Figure 2.6. Experimental setup for kneading dough.

1 – regulators, 2 – shafts, 3 – table, 4 – electric motor;

The coefficient of elastic recovery of the test is calculated using the following expression [8]:

$\varepsilon_b = \frac{\delta_x}{a}$, (1)

Where

δ_x- the thickness of the test tape after rolling, m;

a- distance between shafts, m.

A device consisting of a cylinder, a piston, and a table for placing cargo was used to study the change in the density of the test semi-finished product depending on the pressure. During the experiment, 50 g of dashboard dough was used. To determine the height change of the text placed inside the cylinder, a pointer that is in rigid contact with the piston shaft inside the cylinder, and a measuring ruler is attached to the device body. A magnifying glass attached to the instrument body is used to determine the offset relative to the ruler.

The density of the test is determined by the following expression[10].:

$\rho = \frac{m}{V}, kq/m^3$ (2)

Where

m - the mass of the dough, kq;

V- the volume of dough in the cylinder,m^3.

The volume of dough in the cylinder is determined by the following expression [2].

$$V = \frac{\pi d^2}{4} h, \quad (3)$$

Where

d- diametr of cylinder,m;

h- height of the part of the cylinder filled with dough,m^3.

Analysis of the research results

The results obtained show that the moisture content of the dough, the distance between the shafts and the number of repeated rolls affect the elastic recovery coefficient of the dough (table 1). The analysis of the study shows that as the moisture content of the dough increases, the elastic recovery coefficient also begins to increase. When the value of the shaft spacing is $a = 2{,}0 \cdot 10^{-3}$ m, with a dough humidity of W = 45%, the elastic recovery coefficient ε_b= 1,65, with a dough humidity of 47%, $a = 1{,}70$, and a dough humidity of 50% increases and becomes $\varepsilon_b = 1{,}75$ (rolling was repeated once). As the distance between the shafts increases, the coefficient of elastic recovery decreases. So, with the distance between the shafts $a = 1 \cdot 10^{-3}$ elastic recovery coefficient ε_b=2,30, $a = 2\cdot 10^{-3}$ m elastic recovery coefficient ε_b=1,65, and at the distance between the shafts $a = 3\cdot 10^{-3}$.The coefficient of elastic recovery is equal to ε_b=1,5. With an increase in the number of repeated rolls, the coefficient of elastic recovery in the dough begins to decrease. The distance between the shafts a =3· 10^{-3} m, test humidity W =45%, elastic recovery ε_b=1,5 with a single unfolding of the test mass, when it spreads for the second time, ε_b=1,43, and when it spreads for the third time, ε_b=1,33.

Table 1

The results of experimental studies conducted depending on the thickness of the dough $\delta_x(m)$, the coefficient of elastic recovery ε_b, its humidity W (%), the distance between the spreading shafts a(m) and the number of rolls (n)

W,%	$a \cdot 10^3, m$	The amount of rolled dough, n					
		1		2		3	
		$\delta_x \cdot 10^3, m$	ε_b	$\delta_x \cdot 10^3, m$	ε_b	$\delta_x \cdot 10^3, m$	ε_b
45	1,0	2,3	2,30	2,2	2,20	2,0	2,00
	1,5	2,8	1,86	2,6	1,73	2,5	1,66
	2,0	3,3	1,65	3,2	1,60	3,1	1,55
	2,5	3,9	1,56	3,8	1,52	3,6	1,44
	3,0	4,7	1,50	4,4	1,43	4,1	1,33
47	1,0	2,4	2,40	2,3	2,30	2,1	2,10
	1,5	3,0	2,00	2,8	1,88	2,5	1,67
	2,0	3,4	1,70	3,3	1,65	3,2	1,60
	2,5	4,0	1,60	3,8	1,52	3,5	1,40
	3,0	4,7	1,56	4,4	1,47	4.1	1,37
50	1,0	2,5	2,50	2,3	2,30	2,1	2,10
	1,5	3,3	2,20	3,2	2,10	3,0	2,00
	2,0	3,5	1,75	3,4	1,70	3,3	1,65
	2,5	4,3	1,70	4,2	1,68	4,0	1,60
	3,0	4,9	1,60	13,2	1,50	13,0	1,40

Thus, it can be concluded that by re-rolling the dough several times, it is possible to reduce the coefficient of elastic recovery and thereby obtain a semi-finished dough of the required thickness. During the technological process, the mass of the dough subjected to mechanical processing changes its density depending on the pressure. In the process of forming national flour products, when designing technological equipment, it is necessary to take into account the change in dough density depending on mechanical pressure. Thus, the density of the dough affects the quality of the finished product and productivity [7,8,9,10].

The change in the density of the dough depending on the pressure is shown in table 2. As can be seen from the table, with increasing pressure, the density of the dough begins to increase. This is due to the fact that as a result of the influence of microbiological processes during processing, porosity is created in the dough, and as the pressure force increases, the dough gradually begins to shrink. After the pressure value $P = 245{,}5$ kPa, the density of the dough remains unchanged. A similar situation occurs with different values of dough humidity.

Table 2

Changing the density of the dough depending on the pressure (test storage time t=10 min., temperature $T = 20^0\ C$

№	Preassure P,kPa	Density of dough $\rho, kq/m^3$	
		W=45%	W=50%
1	30,60	1112,4	1113,5
2	60,47	1115,7	1116,8
3	90,30	1125,5	1127,9
4	130,20	1137,6	1138,7
5	169,93	1143,5	1143,6
6	200,74	1160,3	1160,3
7	245,50	1160,9	1160,8

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