THE INFLUENCE OF GLUTEN'S ADDITION ON FROZEN SHEET DOUGH QUALITY

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Abstract

For the obtainment of frozen sheet dough choosing ingredients is very important. In the manufacturing recipe of frozen sheet dough we experimented with an addition of gluten. The finished products were sensorial analyzed regarding aspect, texture and friability.
Keywords: *frozen sheet dough, aspect, texture, friability*

Introduction

Frozen dough market has been constantly growing because of consumers' demand for practicability and high quality baking products. The use of frozen dough has developed increasingly, especially in bakeries, restaurants, because they permit a relative easy obtainment of products and have great economical efficiency (Neyreneuf, 1991).

Practical experience, as well as the research reported in literature, clearly indicates that certain measures must be considered to ensure stable dough:

- reduced water absorption;
- reduced dough mixing temperature;
- high level of shortening;
- high level of yeast;
- high level of surfactant;
- straight-dough no-time baking method;
- freezing of dough immediately after mixing;
- suitable packaging having moisture and oxygen barriers;
- freezer temperature of -23°C.

Frozen dough technology comprises two major steps: dough preparation (structure building) and dough processing (freezing and storing) (Kulp, 1995; Inoue, 1992).

At the obtainment of pastry dough the entire technological process of sheet dough manufacturing suffers changes in order to make an optimum

product. In this case it is sought that, after baking, the dough to detach itself in many overlapping sheets (Bordei, 2004).

The correct choices of ingredients are extremely important for counterattacking the negative effects of storage in frozen state and defrost of pastry products (Grandvoinnet, 1997).

This paper shows own researches concerning the influence of the addition of gluten over the quality of frozen sheet dough.

The checking of frozen sheet dough's quality was made by organoleptical analysis of the finished product.

Experimental

The researches were made in the milling-bakery company S.C. Pambac S.A. Bacau on a technological line of obtaining sheet dough for pastry. The raw materials and the manufacturing recipe used in the experiments were: flour 480-1 kg; margarine-35%; salt-1.6%; water-57%; vinegar- 0.6%. For improving the quality of frozen sheet dough, an addition of gluten is used. For determining the dough's rheological characteristics, we used the Chopin alveograph and the Brabender farinograph.

Unlike classic technology, the obtained sheet dough was frozen at a temperature of -30^0C for 30 minutes, and then stored in that state at a temperature of -18^0C over periods varied between 10 days, 20 and 30 days.

At the end of each storage period the samples were defrosted slowly: defrosting time 35-45 minutes; defrosting temperature 28-30^0C. For quality verification of frozen sheet dough the pastry products were baked at the end in a rotational type oven. The baking was made following these technological parameters: baking time 12-13 minutes; baking temperature 210-220^0C. The pastry products obtained were analyzed from an organoleptical point of view (aspects, texture and friability). Members of the tasting committee were instructed concerning the criteria for grading the samples, so that every product was appreciated with grades from 0 to 10 as following: between 0 and 2.5 unsatisfactory, between 2.5 and 5 insufficient, between 5 and 7 acceptable, between 7 and 9 good, between 9 and 10 very good.

Results and Discussions

Vital gluten is used in bakery due to wheat flour's various qualities, in order to improve it. The addition is based on gluten proteins' property to form continuous, elastic, extensible and gas impenetrable network, on which

bread quality mostly depends. The effect of gluten addition depends on the degree and speed of homogenizing and bonding with flour's gluten proteins. This bonding is influenced by the quality of flour's proteins and by vital gluten's granularity (Bordei, 2004).

In the manufacturing recipe vital gluten was added in three distinct quantities: 0.5%, 1.0% and 2.0%, compared to flour quantity.

After dosing according to flour, the mixture was then mixed and homogenized and analyzed in the testing laboratory. In order to make the alveograph analysis we used 250g from the homogenized mixture and 300g for the farinograph analysis. The results obtained are shown in tables 1 and 2.

Table 1: The influence of gluten addition over rheological properties of raw material flour

Sample number	Gluten addition [%]	Alveogram characteristics			
		P [mm]	L [mm]	W [10^{-4}J]	P/L
1	0.5	91	74	234	1.23
2	1.0	94	69	239	1.36
3	2.0	113	62	265	1.82

The alveogram shows the following characteristics: height, P, measured in mm corresponding to dough bubble's maximum pressure and is interpreted as deformation resistance or as dough stability; width, L, in mm is interpreted as dough extensibility; deformation energy, W, in cm, is strongly tied to flour power, flour hydration capacity. Dough deformation action is calculated in 10^{-4}J.

The alveograph shows that gluten addition has led to an increase in dough's resistance (P), a decrease of extensibility index (L) and an increase in quantity of energy absorbed by the dough at extension (W).

Table 2: The influence of gluten addition over technological properties of raw material flour

Gluten addition [%]	Farinogramme characteristics					
	Absorption capacity [%]	Development [min.]	Stability [min.]	Elasticity [U.B.]	Softening [U.B.]	Power
0.5	57.8	1.3	4	120	70	48
1.0	57.8	1.3	4.30	110	50	51
2.0	58.4	1.3	5.3	130	55	52

The farinograph shows an increase of hydration capacity, of dough stability and an improvement in power.

The samples pastry products obtained from frozen sheet dough with vital gluten addition were analyzed from an organoleptical point of view in the testing laboratory at S.C. Pambac S.A.

Table 3: Results obtained on organoleptical properties by adding vital gluten

Sample number	Storage duration [days]	Added gluten quantity[%]	Organoleptical analysis results
1	10	0.5	8.20
2		1.0	9.15
3		2.0	8.75
1	20	0.5	7.90
2		1.0	9.15
3		2.0	8.60
1	30	0.5	8.00
2		1.0	8.80
3		2.0	8.40

Figure 1 shows the influence of vital gluten on organoleptical properties:

- an increase in gluten quantity from 0.5% to 1% led to an improvement of sensorial properties, especially texture and exterior aspect, in average with 11,6%;
- comparing to the sample with 1% gluten addition, the 2% sample shows a decrease of organoleptical properties, in average by 5%;
- prolonging the storage duration in frozen state from 10 days to 20 days and respectively, 30 days did not have a significant influence on the product's organoleptical properties, in the case of gluten addition.

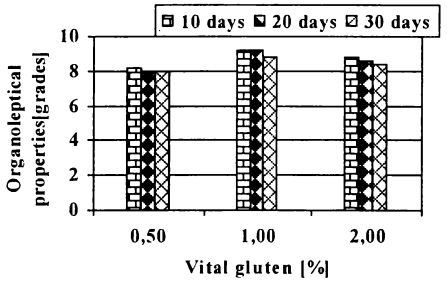

Fig. 1: The influence of gluten addition on finished products' organoleptical properties

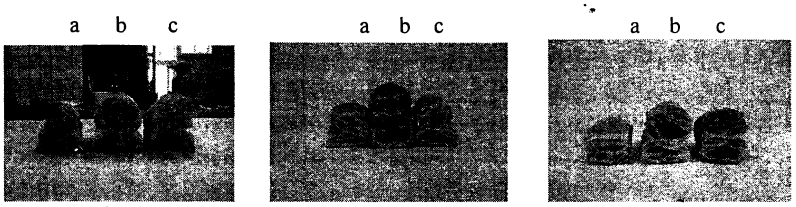

Fig.2: Finished products with addition of gluten (a-0,5%; b-1%; c-2%): 1-after 10 days storage; 2- after 20 days storage; 3- after 30 days storage

Conclusions

Vital gluten addition in frozen sheet dough improves bakery products' sensorial properties, especially their texture and exterior aspect.

The storage duration in frozen state of sheet dough does not influence the finished products' organoleptical properties.

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