

Improvement of baking parameters of frozen part baked Barbari bread by using gums and enzymes

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Abstract:

Production of frozen part baked bread is a successful method for these objects. In this research, production and some properties of part baked flat bread (Barbari) like, water activity, volume, porosity, hardness,... were evaluated, after the storage of -18°C for 15 day and full baked. Result showed that addition of guar (0.4) and lipase (0.05) improved all quality parameters.

Keywords:BarBari bread, part baked, freezing, guar gum and lipase enzyme

1-Introduction:

According to the population tendency to consumption fresh bread and considering especial role of bread in the daily diet. One of the important factors considering by researches and manufacturing produced bread with high quality and long shelf life. Bread after backing, quickly occurs physico and chemical changes that called staleness.(1) These changes caused decrease the bread fresh, remove moisture form crumb and increase firmness, reduce flavor and aroma (1,2). At century 21 freezing technology introduced to bakery industry in order to increase storage time of bread, continuous production to available bread at any time and reducing completely traditional processes method (3,4).

Bread produced in this method, thought part baking, freezing and storage. Main objective in part baked frozen bread was baking in two stages: at first, baking to formed crumb without any crust color formation, two, storage then full baking.(4,5)

In cycle freezing, storage and thawing, response chain led to form some component which reducing quality and damage to structure of bread reduce final bread volume and quality of it. Its impossible avoids them. (6,7) Researcher suggested using additives' improved bread quality for adding to recipe of frozen bakery products. (3,8,9)

suggested adding guar gum to frozen bakery product recipe, because effect on dough stability, binding with water, improved mixing, increase shelf life as binding to water and inhibit synerisis.(10,11,3)Lorenzo and et al (12) investigated the effect of hydrocolloids' on rheology of frozen dough free gluten; showed using this ingredient can improve the quality of final products. using enzymes with hydrocolloids because of their effect on delay staleness with reducing retrogradation of amylopectin can improved the structure quality of part baked frozen bread.(3) Among the different bread improvement, in two last decays, using lipase

increased. Adding lipase to formulation cause better formation crumb, improved softness, influence on retrogradation (13,14). Suggested using combination enzymes increase quality of part baked bread and decrease crust flaking.(15)

This study aim to investigate the effect guar gums and lipase to improvement rheology and quality of part baked frozen BarBari bread.

2-Material and method:

The ingredient used for bread making were: white wheat flour (from Razavi factory) properties of flour showed in table1 (AACC200). The compressed yeast (from leaven Razavi) and other ingredients (salt, sugar, fat) purchased from local market. Lipase enzyme (4000 SKB) supplied by Rodhia France and guar gum (3500 SKB) afforded from Novozymes France.

Table 1-Properties of flour

Ingredient	Protein	Moisture	Ash	Fat	Wet gluten
%	10.8	10.52	0.79	1.76	26.7

Dough formulation, based on flour were, (flour 100, %55 water, %1.2 salt, %0.8 sugar, %2 fat, yeast %0.7). Different dose of guar and lipase added according to table 2.

Table 2- factorial design for samplings

T	G1L1	G1L2	G1L3	G2L1	G2L2	G2L3	G3L1	G3L2	G3L3
Guar	0	0	0	0.4	0.4	0.4	0.8	0.8	0.8
Lipase	0	0.05	0.07	0	0.05	0.07	0	0.05	0.07

Dough was optimally mixed for 8 min (2 min in low speed and 6 min at high speed) then 30 min rest to first fermentation after divided into 250g pieces, hand rounded, mechanically modeled into BarBari Bread and proofed for 45 min at room with 47°C and %88 moisture. The bread was part baked in experimental battalion pan (from Italy) at 210°C for 7 min to obtained texture structure before starting coloring reaction , cooled at room temperature and packed polyethylene films, then moved to blast freezer to freezing and storage at -18°C for 15 day. The full baking done at 260°C for 8 min. the bread cooled and the rheology and quality test was measured.

2-1-Water activity:

This parameter measured by water activity meter, Novasina msI aw Air Ltd from Switzerland at 25°C.

Moisture content:

The moisture content of crumb and crust was determined by placing the samples in an oven 205°C about 24 h.(16)

2-2-Volume:

For all sample from the middle of bread cut 5*5 pieces and measured volume by displacement Canola. (17)

2-3-Porosity:

Porosity evaluated by using image j software, active 8 byte and make binary option and measure black and with point ration as a porosity; the picture get by scanner with 300 resolution and saved by jpg format in computer.

2-4-Texture analyses:

Texture analyser (CNS Farnell by UK) measured distance as a tensile capacity and load as firmness. The instrument properties for done was: Distance: 30 mml Speed: 30mml/min, Target value: 30mml, Trigger point: 0.5 N (50gr) and has aluminum probe with 10 mml Diagonal.

2-5-Statistical analysis:

Data using for test done in factorial (3*3) with 2 repeated based on complete randomize design. Data was analysed by Anova with statistica version 9 and determined significant difference of mean by Duncan test. Microsoft excels using to plot chart.

3-Result and descusion:

3-1-Water activity:

Adding guar gum and lipase independently and interaction with show no significant difference. In research results Primo_Martin and et al (2008) showed adding enzyme to bread don't increase water activity; they suggested enzymes binding with water then decrease water activity. (16) Hydrocolloids able to associated to water trough hydrogen binding as result, reduce water activity.(3)

3-2-Moisture content:

As a result show in chart 1, increase guar concentrations Rh was greater than the control sample. Adding lipase to frozen part baked BarBari bread doesn't has any effect on Rh. The interaction of guar and lipase, maximum moisture content showed in G3L1 (chart2). Guar gum, binding water through hydrogen bounds binding water, cause remain water during storage of frozen part baked. (18, 19)

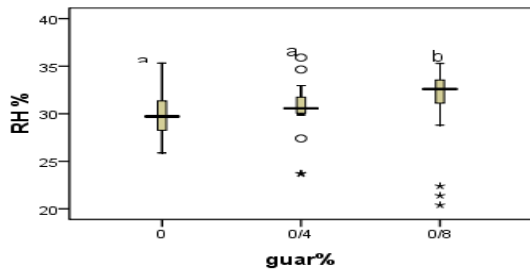


Chart 1: Effect guar on moisture content

*different letter indicated significant different in the last minimum level p<0.05.

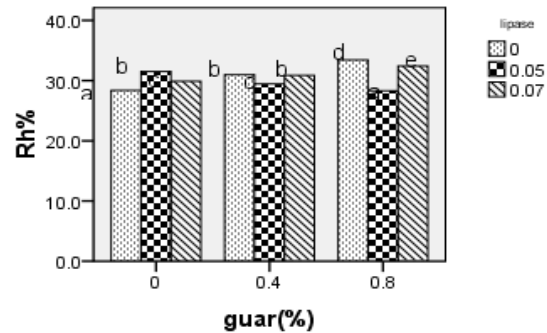


Chart2: interaction effect of guar and lipase

3-3-Volume:

As a seen in chart 3, guar gum at 0.4 concentration caused increase volume and further amount of it reduce volume. Lipase, caused increase volume in comparison of control bread, but no significant difference between concentrations it.

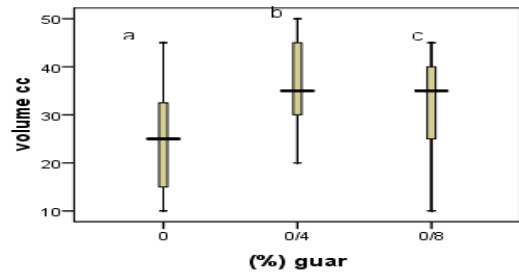


Chart3: effect guar on volume

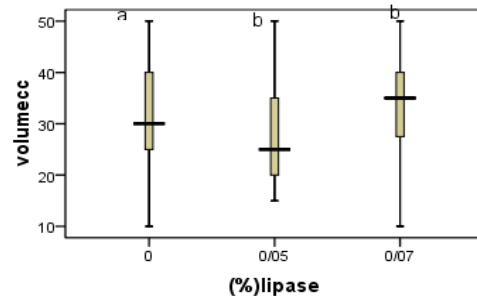


Chart4: effect lipase on volume

In combination guar and lipase, showed maximum volume at G3L1 after it seen in G2L2 and G2L3 with no significant difference (chart 4).

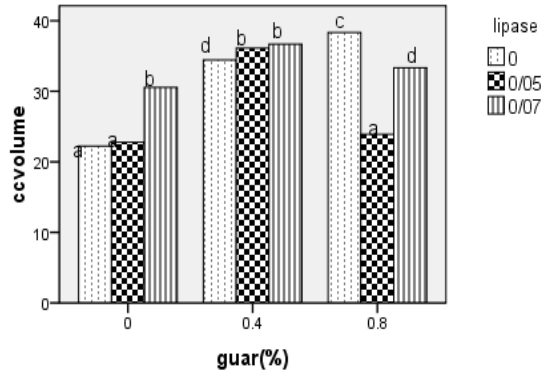


Chart5: interactive effect guar and lipase

Using guar at 0.4 and lipase in 0.05 concentration improved volume of BarBari bread after cycle part baked, freezing, frozen storage and full baked.

Expressed adding guar to frozen bakery product, caused increase dough stability during proofing which influenced on increase dough strength to holding gas cells during baking and frozen storage.(20) Hydrocolloids effect on increase consistency dough, formed temporary gel network and increase stability of cell walls which covered gas cells, then improved holding co2 produced in dough then increase final product volume (21, 22). The reason of reduce volume followed by increase amount of gum was watery gluten proteins due to increase moisture by using gum, in result caused dough adhesive (21, 22). Other researcher also showed similar result by using gum and increase volume in bread (23, 22 and 9)

3-4-Porosity:

According result showed in chart 5, guar in 0.4 concentration increase porosity. Adding lipase increased porosity in comparison control but by increasing amount of it don't effect on to more porosity.

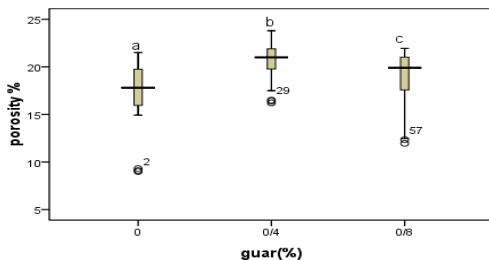


Chart6: effect guar on porosity

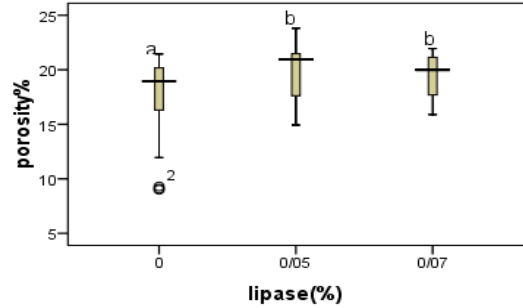


Chart7: effect lipase on porosity

The result given from interactive effect guar and lipase, showed guar at 0.4 and lipase at 0.05 concentrations cause maximum porosity. (Chart 6)

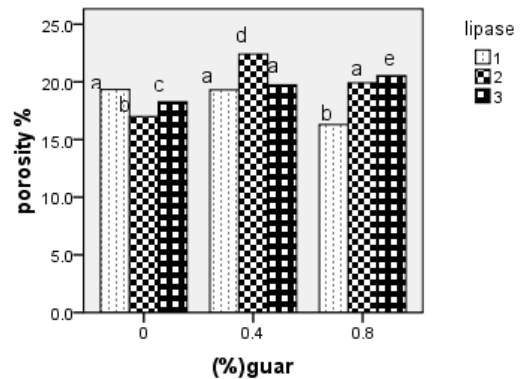


Chart 8: interactive effect of guar and lipase on porosity

According result obtained from effect guar and lipase alone and in combination concluded adding guar at 0.4 and lipase at 0.05 concentration improved porosity of part baked frozen bread after full baking.

3-5-Load:

Adding Guar at 0.8 concentrations caused decrease firmness (chart7). According result seen in chart 8, lipase at 0.07 amount decrease firmness.

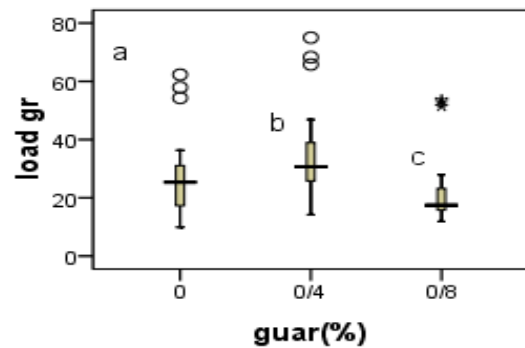


Chart9: effect guar on firmness

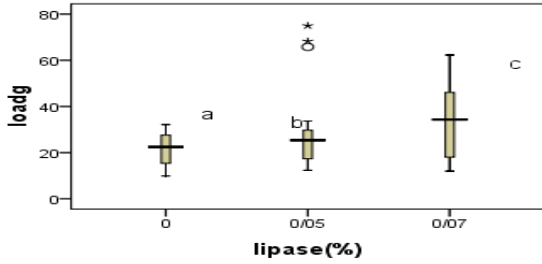


Chart10: effect lipase on firmness

The result showed treatment G2L2 decrease firmness at interactive effect of guar and lipase (chart9). Suggested that guar binding to water and inhibit transfer water from gluten to starch, because amylose and amylopectin in starch in the presence of water, re-crystalline and forming polymers that cause firmness bread (19, 18). Reduce the softness of bread when using lipase, because formation complex lipid with amylose and amylopectin (24), also monoglycerids that generation by lipase, has anti staling effect due to delay retrogradation of starch as result cause reduce firmness of bread in storage time (13).

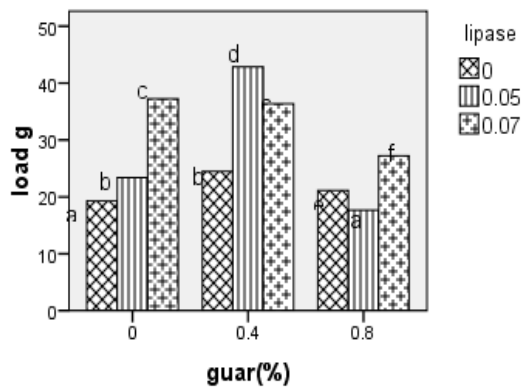


Chart11: interactive effect of guar and lipase on firmness

3-6-Distance:

According result shows guar at 0.4 amount increase distance (chart 10). Adding Lipase concentration improved distance in comparison with control (chart 11).

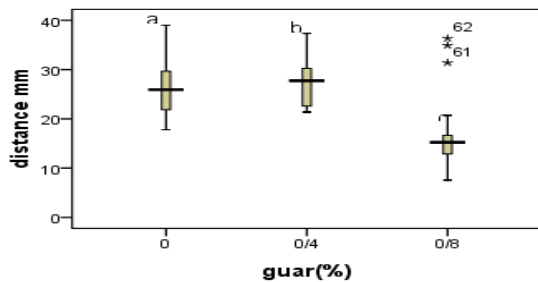


Chart 12: effect guar on distance

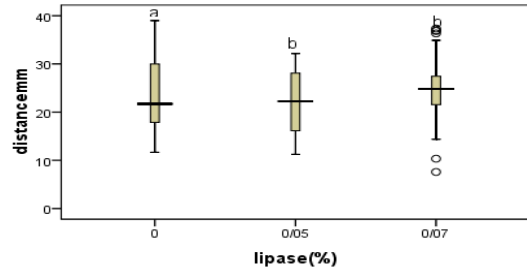


Chart 13: effect lipase on distance

The interactive effect of guar and lipase on distance, showed maximum effect in G2L3 (chart12). This result given in Sheykholeslam et al (23) research that Expressed using guar reduce tensile capacity and increase concentration from 0.5g caused reduce it.

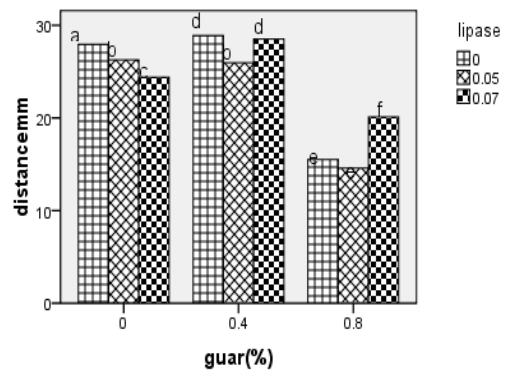


Chart14: interactive effect of guar and lipase on distance

4-Conclusion:

The result given from test demonstrated, adding guar at 0.4 concentrations improved volume, moisture content, porosity and texture properties in frozen part baked BarBari bread after storage and full baking. Using lipase, influenced on increase volume, porosity and texture properties, but no significant difference between amounts of it. Interactive effect of guar and lipase on measured parameter showed best result on G2L2. This result displayed using guar and lipase at frozen part baked bread can be useful.

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