

## Effect of adding three levels of Guar on the rheological, sensory and storage properties of biscuits

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### Abstract

Effect of adding three levels of guar powder to the local flour was studied, and the addition rates were 2, 2.25 and 2.5%. The chemical composition of all mixtures was estimated, as the values of the proportions of the components varied among themselves according to their chemical composition. The rheological characteristics of the studied mixtures were studied, as the absorption rate of Water 65.7, 69.1, 69.5 and 70.0% for treatments A, B, C and D respectively, as the increase in the added Guar ratio improved the absorption rate because of its excellent properties in binding water, and the values of the maturation time/min were 2.3, 2.8, 3.0 and 3.1 minutes for all transactions, respectively. As for the stability period, it was 4.9, 6.5, 6.6 and 6.8 minutes for all transactions, respectively. The addition of guar powder at a rate of 2.5% improved the storage period of the product and preserved its organoleptic characteristics.

Keywords: rheological properties, Guar, hydrocolloids, biscuits, storage conditions, flavor enhancement.

مدى تأثير إضافة ثلاثة مستويات من الكوار على الخصائص الريولوجية و الحسية و الخزنية للبسكت

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الخلاصة

تم دراسة تأثير إضافة ثلاثة مستويات من مسحوق الكوار الى الطحين المحلي وكانت نسب الإضافة 2، 2.25 و 2.5 % وقد تم تقدير التركيب الكيميائي للمخاليط كافة ، اذ تباينت قيم نسب المكونات فيما بينها تبعاً لتركيبها الكيميائي وقد درست الصفات الريولوجية للمخاليط المدروسة ، اذ بلغت نسبة امتصاص الماء 65.7 ، 69.1 ، 69.5 و 70.0 % للمعاملات A ، B ، C و D على التوالي ، اذ أدت زيادة نسبة الكوار المضافة الى تحسين نسبة الامتصاص لما له من خصائص ممتازة في ربط الماء ، كما كانت قيم مدة النضج / دقيقة 2.3 ، 2.8 ، 3.0 و 3.1 دقيقة للمعاملات كافة على التوالي . اما مدة الاستقرار فكانت 4.9 ، 6.5 ، 6.6 و 6.8 دقيقة لجميع المعاملات على التوالي . أدت إضافة مسحوق الكوار بنسبة 2.5 % الى تحسين مدة الخزن للمنتج و الحفاظ على صفاته الحسية.

الكلمات المفتاحية : صفات ريولوجية ، كوار ، غرويات مائية ، بسكت ، ظروف خزنية ، تحسين النكهة

## Introduction:

Issue of obtaining a high quality product was and still is a disturbing factor for workers in this field because of its economic importance as well as its importance to humans. Therefore, the process of cementing flour and its optimal exploitation was the main concern of specialists in this field. The issue of adding materials to improve results was an important factor in studying the effect of these additions on the texture and texture of manufactured products. During the course of bakery production, certain powders such as baking powder and vanilla were added, as well as improved materials to improve the quality of baked products from a sensory and morphological point of view. Therefore, the desire to use guar to improve the quality of biscuits and pastries in general was due to the improvement in the quality characteristics of other local products such as cake And cupcakes and others, guar and its gum are important materials for improving the aqueous media in which it is present due to its activity in cold water, causing the dough to obtain greater cohesion when it is present in low concentrations (Sharma, 2007). The research aims to study the effect of adding guar powder on the rheological, sensory and storage properties of local biscuits.

## Materials and methods:

Local flour, supplied by the General Company for Grain Trade / Salah al-Din (Al-Akha Mill), was used. Indian-origin guar powder, which was prepared from the local market of Tikrit, was used also, and it was added in three levels, namely 2, 2.25 and 2.5%. Moisture, ash, fat and protein were estimated for the treatments according to the standard method mentioned in A.O.A.C 1984. The tests were performed in three replicates and expressed as a percentage.

The mixtures for the biscuit industry were prepared as follows:

Table (1) The proportions of the components of the blends

Sample Code	Guar Ratio %	Flour Ratio %
A-Control	0 %	100 %
B	2 %	98 %
C	2.25 %	97.75 %
D	2.5 %	97.5 %

The samples were prepared according to al-alam (2008) by mixing the ingredients, using two cups of the mixture, or the equivalent of 180 g, and adding to it 125 ml of milk, 70 ml of oil, two eggs, 80 g of sugar, 10 g of vanilla and 10 g of baking powder (Baking). powder), the dough was placed in the molds and baked at 180 ° C for 20-25 minutes.

## Estimation of rheological properties:

The tests for the rheological properties of the dough were carried out according to what was mentioned in (A.A.C.C, 1998) using a farinograph device - the General Company for Grain Trade - Salah El-Din Branch / Tikrit.

**statistical analysis :**

Statistical analysis was carried out using CRD Complete Randomized Design in order to calculate the effect of adding guarant levels to the studied sample, and the averages test was conducted using the Dunkan test using the SPSS program (2009) for this purpose.

**Results and discussion:**

Table (2) chemical composition of the mixtures

Chemical component %	A	B	C	D
Moisture	13.933 d	14.033 c	14.233 b	14.600 a
Ash	1.1000 b	1.2333 ab	1.3000 a	1.3333 a
Fat	1.4333 a	1.3667 b	1.1667 c	1.0333 d
Protein	9.1000 c	9.1330 c	9.2030 b	13.5330 a
Carbohydrate	74.4337 a	74.234 a	74.0973 a	69.500 b

Table (2) shows the percentage values of the chemical components of the mixtures used in the research. It is noted that the moisture content in the mixtures ranged between 14 and 14.6%, as it is noted that treatment D was significantly superior to the rest of the treatments by containing the highest moisture content and amounted to 14.6%, while the lowest was In treatment A, it amounted to 13.93%, as the increase in the percentage of adding guar powder to flour led to an increase in the percentage of moisture, and this is consistent with what was found by (Al-Janabi, 2016), as shown in Table (2) the ash values for all treatments in a row. Treatment D outperformed the The rest of the transactions amounted to 1.33%, while the lowest values were in transaction A and amounted to only 1.1%. These percentages are consistent with what Al-Janabi (2016) found that the addition of colloids leads to a significant increase in the percentage of ash.

The results in the same table show the percentage of fat for the studied samples, and it was found that the percentage of fat gradually decreased with the increase in the percentage of added guarants, and it reached the highest percentages in the control sample, while the lowest percentages were in sample D. The results shown in Table (2) show that the percentage of protein varied significantly. Among the study samples, the highest values were in treatment D, which amounted to 13.53%, while the lowest values were in the control treatment, which amounted to 9.1%. These results have directly affected the percentage of carbohydrates in the studied samples.

**Estimation of rheological properties:****water absorption ratio:**

Figure (1) shows the values of water absorption percentage, which are 65.7, 69.1, 69.5 and 70% for groups A, B, C and D respectively. It is noticed that there are differences in the values of these percentages with the superiority of treatment D over the rest of the treatments, which showed the highest percentage Aqueous absorption of samples, as this value agrees with what was reached by Christopher and others, 1993, who noticed that adding water colloids to flour increases the water absorption rate of flour compared to the control treatment. Barvin et al. 2006 indicated the possibility of using hydrocolloids as multifunctional additives in the food industry to improve

functional properties such as viscosity, water binding capacity, and emulsifier stability. And the water absorption values are affected by the extraction rates and the size of the flour granules (Perten, 1990). It is preferable to flour that has a high water absorption capacity because it leads to an increase in the quantity of production during the manufacturing process (Moses, 2007).

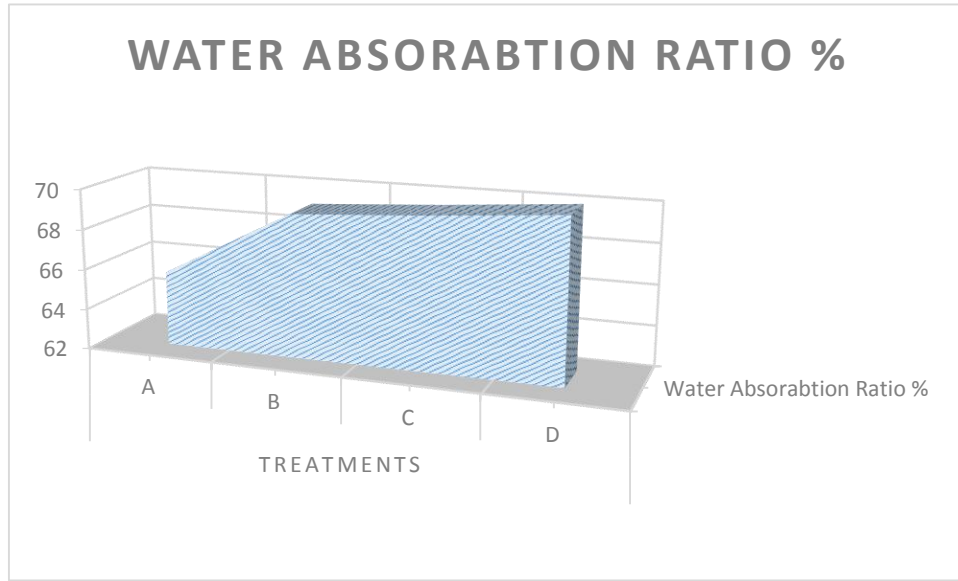


Figure (1) values of the water absorption percentage of the studied mixtures

The results shown in Figure (2) show the values of the maturity periods estimated in minutes for the experimental samples, which amounted to 2.3, 2.8, 3.0 and 3.1 for treatments A, B, C and D, respectively. It is noted that the values of the treatments vary between them, as the addition of quarants led to a rate of 2.5% To improve the maturity period of the dough and thus improve the texture of the dough compared to the rest of the treatments. These indicators are consistent with the findings of Salman et al. (2011). The increase in the maturation time indicates the strength of the flour and the ability of the gluten network to withstand the kneading process (Mohammed and others, 2011), and the maturation period is considered an indication of the quality of the dough and its suitability for processing (Jaber, 1981).

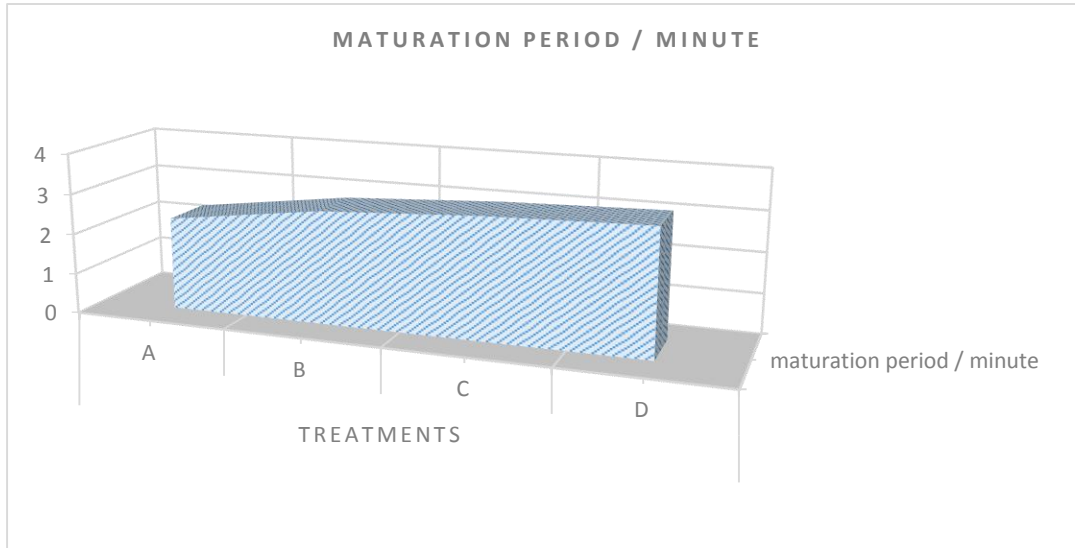


Figure (2) Values of the maturation time/min for the studied mixtures

Figure (3) shows the values of the stability period of the dough, measured compared to the time in minutes, as its values reached 4.9, 6.5, 6.6, and 6.8 minutes for all transactions, respectively. It is noticeable that the discrepancy between their values was evident, as the addition of guar by 2.5% continued to significantly improve the characteristics of the dough, as it increased The stability period per minute ranged from 4.9 minutes in treatment A to 6.8 minutes in sample D, and this is consistent with what was found by Kohajdova and others, 2008 and consistent with what was reached by Al-Janabi, (2016) who indicated that the addition of water colloids increases the stability period of the dough. From the foregoing, we conclude that the increase in the percentage of adding the guar has led to an improvement in the texture of the dough and its rheological characteristics and an increase in the carrying capacity of the gluten network and thus improving the kneading process.

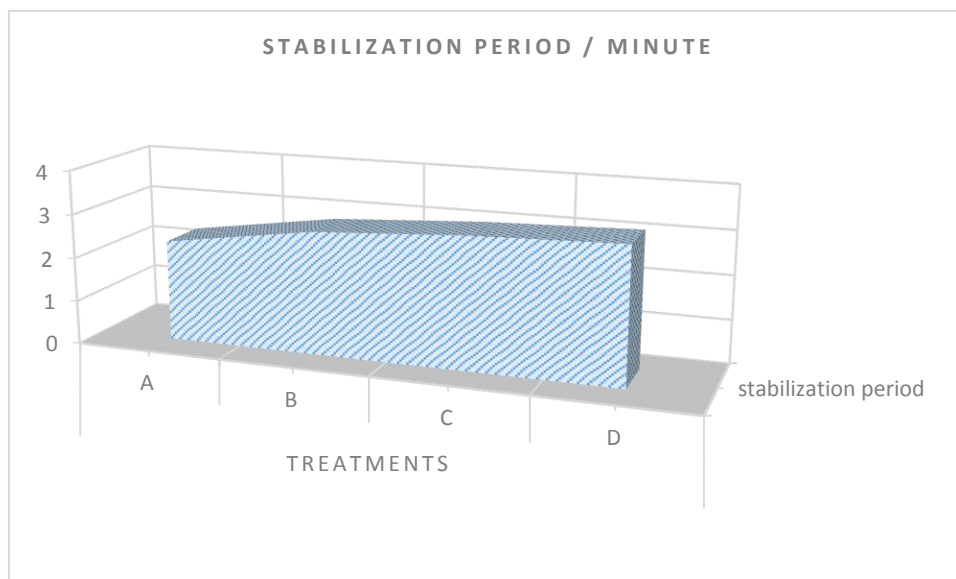
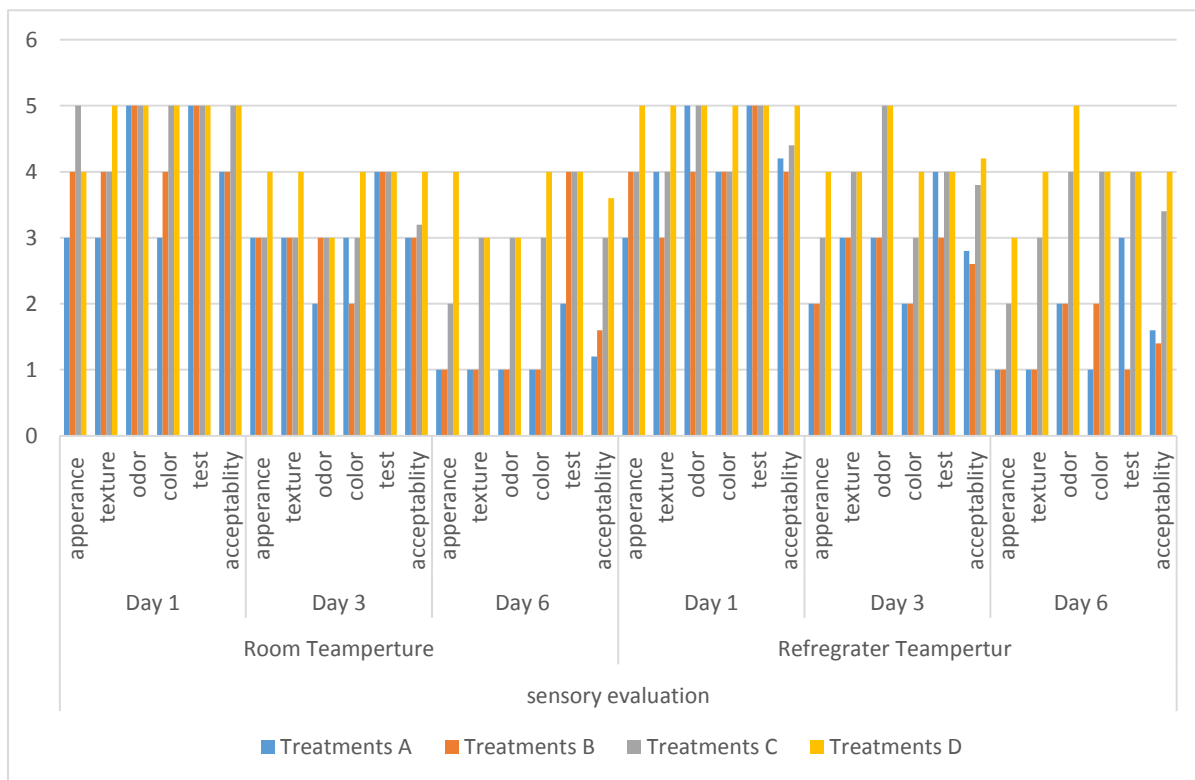


Figure (3) Stability period/min for doughs manufactured from the studied mixtures

**Sensory evaluation of the product:**

The results shown in Figure (4) show a discrepancy between the treatments included in the experiment combinations and under storage conditions at room temperature, and show the superiority of treatments C and D over the rest of the treatments because they gave high palatability and acceptance indicators compared to the rest of the treatments. The degree of general acceptance on the first day reached 5 and It continued to be acceptable and palatable until the sixth day, as it was slightly affected by the storage conditions and recorded a value of 4, and the positive effect of the hydrocolloids represented by guar ore, which provided excellent functional properties for the manufactured product (Mandal et al., 2008) appears, while the treatments A and B were the lowest values. However, they did not differ morally between them and reached only one degree.

Figure (4) also shows that the process of refrigeration has clearly led to the preservation of the desired qualities of the product, and the general acceptance value of treatment D was the highest,



superior to the rest of the treatments, while treatment A was the weakest of transactions. Increasing the preservation period with low levels of quarantin led to the failure to preserve the product's qualities, as the decrease in the degree of color and taste of the product led to a weak evaluation of the product and thus affected the value of its general acceptance, while the increase in the ability to preserve the product's qualities came as a result of the increase in the added quartz ratios. This may be attributed to the functional properties provided by quarks and colloids in general (Kohgjdova, 2008).

Figure (4) Effect of temperature and storage period on the organoleptic characteristics of the product

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