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Simple Technique to Proof Quality of Tannour Flat bread Flour

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ABSTRACT

Two samples of wheat flour from different source; namely, ration card system flour-supplied by Ministry of Trade- Iraq and Hilal brand flour-Turkey; were subjected for quality assessment to making flat bread, using a simple modified technique to ratify baker's claims.

Results illustrated that the Hilal flour exhibited superior characteristics indices than the ration card flour in producing total liberated, retained CO₂ gas, final dough volume after 90 minutes fermentation, dough raising capacity and volume expansion ratio, although both flour were close in wet and dry gluten content %. Accordingly, the results of this test are coincident with the baker's claims as they always praised Hilal flour and hated ration flour; meantime these results revealed to the suitability of this technique as rapid, easy and accurate in ratifying flour types for making flat bread.

Keywords: Flour; dough; flat bread; tannour; fermentation; syringe.

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INTRODUCTION

The flat breads are very popular especially in those parts of the world where bread constitutes a major source of dietary protein and calories. There are several forms of flat bread, and the variation is mainly in terms of ingredient, technology and quality (Mir, et al., 2014). The majority of Iraqi rural citizens like other Middle East countries baking flat bread and called local name Tannour bread (naan, in Kurdish and khubz in Arabic).

Common wheat (*Triticum aestivum* L.) is extensively used for this purpose, but the quality of produced bread and flour and dough handling during processing mainly depends on the composition of the grains in terms of protein, gluten, and starch.

The flat bread prepared from mixing wheat flour with water and yeast (*Saccharomyces cerevisiae*) as a leaving agent which kneaded to form dough. The dough left for time for fermentation, through which sugars of damaged starch granules converted by the yeast into moisture and CO₂. (Mir, et al., 2014).

The suitability of flour for flat bread determined by the type and amount of gluten content, high protein, hard-wheat flour is adapted to bread, which requires elastic dough and often expanded to low density by the leaving action.

Weak dough possess excessive extensibility and lack of elasticity during the shaping stage, due to lack of strength, the gluten will be too weak to retain a lot of CO₂ gas during the proofing and the baking of the bread; in contrast the strong dough possess an excess elasticity and lack of extensibility, therefore it is necessary to make balance between dough elasticity and extensibility in order to get adequate dough and final products characteristics. (Rosada, 2012).

In Iraq homemade bakers complaining from the quality of the flour supplied by ration card system - Ministry Trade-Iraq; without any information declare its specifications; bakers

described the flour as poor quality flour, slow rising, do not bind together, sticky to hand, or cloth cushion and fall from Tannour wall, hard to work with. Therefore, it need be blend with better quality flour.

Several tests has been used to evaluate dough quality such as diastasis activity in terms of gassing power of wheat flour, one of the apparatus used was pressure-meter which measure the pressure of evolved CO₂ from dough in the presence of baker's yeast the value express as mm Hg pressure after five hours fermentation. The test gives an indication of damaged starch levels in wheat flours during fermentation. (AACC, 1983 and 2000, method No. 22-11).

High starch damage causes reduces water absorption at makeup as a result of higher fermentation loss, sticky dough and gas production can be excessive if starch damage is high. (Khan and Shewry, 2009).

Dough volume changes through certain time have also been applied, lower dough volumes for variety of flour was caused by a worse quality of proteins. (Svec and Hruskova, 2004). Accordingly, we suggest modifying the procedure of Klaser (2013), through instillation of syringe to verify flour suitability for Tannour flat bread and proofing the claims of bakers.

MATERIALS AND METHODS

Two samples of wheat flour of different sources, namely; ration card system flour – Ministry of Trade –Iraq without any specification information and Hilal brand flour-Turkey which is labeled as free gluten, protein 7% minimum, were subjected triplicates to the suggested modified quality test through following steps:

Installing the syringe

A disposable syringe of 20ml capacity was used, the needle was rid of and the base was sealed using cigarette lighter flame and pressed with pliers.

1. The plunger (piston) was pulled up from the syringe, and then a piece of fishing cord (20cm length) was inserted inside the barrel till the bottom.

2. A circle piece of 16.5 mm diameter of thin plastic was stick with the bottom of the plunger rubber tip.

3. The dough was prepared by adjusting weight of 4.5g on 14% moisture basis, using the formula of (Stone, 1994. and Hellevang, 1995).

Required weight on (14% moisture basis) = $\frac{\text{required weight} \times (100 - 14)}{100 - \text{sample moisture \%}}$

Similarly the weight of 10 g flour for gluten test was also adjusted on 14% moisture basis.

4. Yeast suspension was prepared by mixing

0.1g of instant dry yeast (*Saccharomyces cerevisiae*) altunsa brand-Turkey, in 2.25ml water and left to activate for 10 minutes, thereafter the suspension was poured to the flour and kneaded for two minutes and inserted into the syringe while the fishing cord was inside.

5. The plunger was pushed into the barrel and pressed against the dough at the bottom, then the fishing cord was pulled out and the syringe with its constituents fixed in a piece of card board foam to help stand vertically in the incubator, and the initial dough volume was recorded which was 5ml, then successive dough volume was recorded after, 30,60 and 90 minutes.

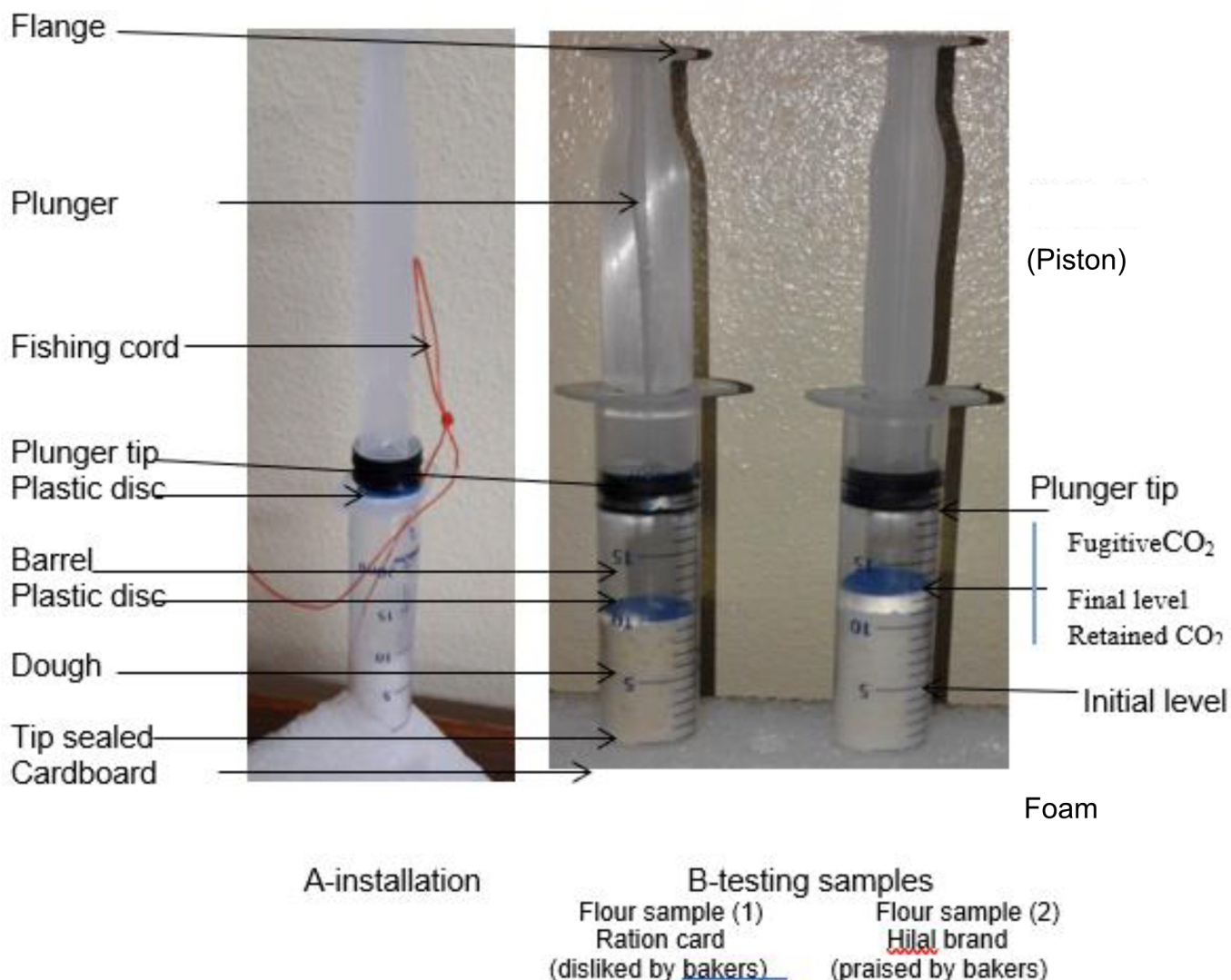


Fig. (1): Installation of the modified syringe technique to verify dough raising capacity and flour quality for making flat bread.

6. The syringe with dough was placed in incubator prefixed at 25°C during test period.
7. At the end of the test the dough volume was recorded, which refers to the dough with retained CO₂ gas released due to fermentation process, while the space between dough level height and plunger was also recorded, the differences reveal to the escaped CO₂ gas which was liberated during fermentation of sugars.
8. Calculations were measured in term of raising ratio, trapped and escaped CO₂ gas liberated during fermentation, volume expansion ratio (Yildirim, 1970).
9. Finally we ratify and proof the Bakers claims and the suitability of the flour for making Tannour flat bread.
10. Flour gluten content as percentage was also measured according to Khatkar (2003).

RESULTS AND DISCUSSION

The results in table (1) revealed that the Hilal flour was close to ration card flour in wet and dry gluten content %, (30.10%, 11.5% and 31.30%, 11.4%; respectively).

Concerning all other quality indices Hilal flour surpassed ration card system flour in all measured traits with an exception of fugitive CO₂ gas.(figure 1 and table 1).

The value recorded for final dough volume after 90 minutes fermentation, total volume under plunger(dough with retained and fugitive CO₂ gas, retained CO₂, total liberated CO₂, rate of CO₂ liberation, and volume expansion ratio were recorded, 12,19, 7, 14, 0.155 and 1.4 ml in comparison to that of ration card flour values which were 10, 18,5,13,0.144 and 1.0; respectively.

Accordingly, the results of this test are coincident with the baker's claims as they praised Hilal flour and described good quality and hated ration flour and described worse in quality; meanwhile these results revealed to the

suitability of this technique as rapid, easy and accurate in ratifying flour types for making flat bread.

The explanation for the results as both flour were close in gluten content %, but different in quality can be attributed to protein quality according to Svec and Hruskova, 2004.whom stated that lower dough volumes for variety of flour were caused by a worse quality of proteins.

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Table (1): Measurements and calculations for ratification of disliked and praised wheat flour by flat bread bakers.

Flour source Specifications	Ration card flour Local	Hilal brand flour Turkey	Calculation formula	Reference for method used
Baker's argument	Bad for flat bread	Good for flat bread		
Moisture content	13.83%	11.65%	$\frac{\text{required weight} \times (100 - 14)}{100 - \text{sample moisture \%}}$	Stone,1994 Hellevang, 1995
Wet gluten%	31.30%	30.10	A/C x100 A = wt. of wet gluten C = wt. of flour	Khatkar, 2003
Dry gluten%	11.4%	11.5%	B/Cx100 B = wt. of dry gluten C = wt. of flour	Khatkar, 2003
Initial dough volume level	5 ml	5 ml		
Final dough volume level	10 ml	12 ml		
Plunger tip level (dough +fugitive CO ₂ gas)	18 ml	19 ml		
Retained CO ₂ gas	5 ml	7 ml	Final dough volume–initial volume	
Fugitive CO ₂ gas	8 ml	7 ml	Plunger tip level-final dough level	
Total liberated CO ₂ gas	13 ml	14 ml	Retained + fugitive CO ₂	
Rate of liberated CO ₂ ml/times in minutes	0.144 ml/min	0.155 ml/min	Total liberated CO ₂ /test time-t (90min)	
Volume expansion ratio	1.0	1.4	$V(t) - V(0)/V(0)$ V(0) initial dough volume V(t) dough volume at time t- (90 minutes)	Klaser, 2013
Dough raising capacity	100	140	(B-A) x100/A A= volume of the dough before fermentation. B= volume of the dough after fermentation.	Khatkar,20 03

