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Production and Improvement of Fino and Pan Breads Made from Different Extractions of Wheat Flour

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Authors' contributions

This work was carried out in collaboration between all authors. Authors MAAK and MHHA designed the study. Author MHHA performed the statistical analysis and managed the analyses of the study and managed the literature searches. Author ARET wrote the protocol and wrote the first draft of the manuscript. Author MAAK manage practical, fiscal and chemicals analysis of the study. All authors read and approved the final manuscript.

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ABSTRACT

Hemicellulase (Hm) and lecithin (Le) were utilized to production of high quality fino and pan breads by using different mixtures of wheat flours 82% extraction rate (WF82) and wheat flour 72% extraction rate (WF72). The results showed that add of 0.5% Hm. alone or mixture of 0.5%Hm. and 1% Le. lead to increased of water absorption to 65.7% compared with WF 72. Add of 0.5% Hm. alone or mixture of 0.5%Hm. and 1% Le. decreased development time from 2.5 to 1.5 min. and increased the stability of dough and resistance to extension (R) and dough extensibility (E) comparing with WF72 and WF82. Use of Hm. and Le. improved produced fino breads quality when use the same flour mixture with and without Hm. or Le. No significant difference occurred between fino bread made from (75%WF72 + 25% WF82 + Hm.) and control sample (100% WF72), but there are significant difference between fino bread made from (75%WF72 + 25% WF82 without enzyme) and control sample (100% WF72).

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According to sensory evaluation results, the most preferred six mixtures selected to produce pan bread as following: (100% WF72), (75% WF72 + 25% WF82), (75% WF72 + 25% WF72+ Hm.), (75% WF72 + 25% WF82 + Hm.+ Le.), (50% WF 72 + 50% WF 82+ Hm.) and (50% WF72 + 50% WF82 + Hm.+ Le.).

Overall score recorded no significant difference between produced pan bread samples, but there are significant differences between samples in crust color, volume, crumb color, crumb grain and softness and that's due to use WF82. Addition of 0.5% Hm. alone or mixture of 0.5%Hm. and 1% Le. increased specific volume of loaves from 3.11 to 3.5 in 75% WF72 + 25% WF82 bread sample. An significant difference appear clearly in volume and specific volume when use Hm. and Le. with 75% WF72 + 25% WF82 or 50% WF72 + 50% WF82. Addition of Hm. and Le. were decrease hardness and improvement texture of produced pan bread due to use Texture analyzer and attributes with high quality and increase shelf-life.

Keywords: Fino; pan bread; Hemicellulase; lecithin; wheat flour and improvement.

1. INTRODUCTION

Wheat flour 82% consisted of wheat flour 72% + almost 10% wheat bran. Wheat bran is composed of many nutritionally valuable components, such as dietary fiber, antioxidants and proteins. Due to wheat flour 82% relatively low price and bigger quantities in Egypt, Its holds a great potential as an ingredient to be used into fino bread. However, most of the previous studies have shown that wheat bran usually decreases the quality of bread products. Besides the particle size reduction and enzymatic treatment cause to release valuable components from the wheat bran matrix, to concentrate the dietary fiber, to alter the physico-chemical properties of wheat bran and increased the amount of reducing sugars (Javed et al. [1]).

Hemicellulases are a diverse group of enzymes. They are the key components in the degradation of plant biomass. Their substrates are a heterogenous group of branched and linear polysaccharides called hemicelluloses. Hemicelluloses are bound together with hydrogen bonds to the cellulose microfibrils in the plant cell walls. The catalytic modules of hemicelluloses are either glycoside hydrosylates or carbohydrate esterases. Use of hemicellulases can add several properties to the fino bread product such as reduced calorie, stabilization colloids and a source of insoluble dietary fiber. (Shallom and Shoham [2]).

Arabinoxylans can also affect the loaf volume as well as the crumb and crust characteristics of bread. The proportion of water insoluble arabinoxylans in wheat bran has a negative impact on the volume of bread in addition, insoluble arabinoxylans improved the shelf life of bread more than soluble arabinoxylans due to a slower hardening of the inner parts of bread. At the same time, the amount of insoluble arabinoxylans had a negative effect on the volume of bread (Courtin and Delcour [3]). When treating wheat bran with xylanases at low water content, the highest degree of solubilisation of arabinoxylans from wheat bran can be reached at 40 % water content (Santala et al. [4]). However, Lappi et al. [5] have shown that enzymatic treatment combined with sourdough fermentation can improve the baking quality of wheat bran (Sakiyan et al. [6]). Suggested that interactions between the swollen starch granules and the protein network actively contribute to crumb firming. Also Demirkesen et al. [7]) reported that addition of lecithin improved significantly the firmness of bread.

Emulsifiers are fat-like substances and can be found naturally in fats and oils of animal or vegetable origin. Lecithin is obtained mainly from soya or rape by solvent extraction. Depending on the flour quality and the type of baked goods, the emulsifier lecithin is commonly used in amounts of 0.2–0.5 %, for the production of bread and rolls (Golitz and Funke, [8]). Lecithin (Lec.) has been proven to increase specific volume in wheat bread and to promote softer bread crumb (Eduardo et al. [9]).

The Egyptian government depend on wheat flour 72 to production of fino and pan bread, but depend on WF82 for production of Egyptian balady bread which distribute to people by governmental electronic card system. The main goal of this research was how to produce high quality fino and pan breads to consumed by school age children. The investigation point was developing sustainable method to modify the structure of wheat bran by enzymatic treatment. The effect of these method on the products quality was tested in baking of fino bread and pan bread processes. This study aimed to produce high quality fino bread by using wheat flour 82% extraction rate according to Egyptian balady bread attribution system instructed by Egyptian Ministry of Supply and Interior Trade .

2. MATERIALS AND METHODS

2.1 Materials

Wheat flours: wheat flour 72% and 82% extraction rates obtained from Faculty of Agricultural, Cairo University (bakery products pilot plant).

Lecithin: was obtained from Cornell laboratory. Cairo, Egypt.

Hemicellulase enzyme, Pentopan mono BG 750 unit/g, Novo Nordisk, Denmark.

Baking Ingredients: yeast, sugar, corn oil and salt were obtained from local market Giza, Cairo, Egypt.

2.2 Methods

2.2.1 Chemical analysis

Moisture, protein, ash, crude fiber and ether extract were determined according to the methods described in (AOAC, [10]). Total carbohydrates were calculated by difference.

2.2.2 Rheological properties

2.2.2.1 Farinograph test

The farinograph (877563 Brabender farinograph Germany HZ 50) was used to study the hydration and mixing characteristics of the dough under investigation according to (AACC, [11]).

2.2.2.2 Extensograph test

Extensograph test was carried out according to the method described in the (AACC, [11]) using an extensograph type: 4821384 (Brabender .Extensograph Germany HZ 50).

2.2.3 Experimental design

According to Egyptian government, the bakers should use WF82 (Balady flour) to production of bakery products in cause of distribute it under the governmental electronic card system, this research depend on hierarchical order as following :

- Pre-test: use of different wheat flour mixtures from WF82 and WF72 with normal procedure but with hot water (5 samples)
- Test: Comparing the previous test with new treatments (Hm or Le) to study the effect of Hm or Le or both of them on the produced fino bread quality (11 samples).

2.2.4 Fino bread production

Fino bread dough was made according to the method described by Samar et al. [12]) by using flour mixture showed in Table 1. and Table 2 with the following ingredients: flour blends WF 82% or WF 72% (100%), yeast (1.6%), salt (0.2%), sugar (2%), corn oil (5%) and hot water 90℃ (40 – 50%). Dry ingredients were mixed first, then moistened with hot water (90ºC) and finally yeast (dissolved in 50 ml of pre-warmed water and 5 g sugar) was incorporated.

Table 1. Formula used in fino bread production pre-test

Materials \ Trt.		Control	1	2	3	4
wheat flour 72%	25%			*		
	50%				*	
	75%					*
	100 %	*				
wheat flour 82%	25%					*
	50%				*	
	75%			*		
	100%		*			
Sugar		*	*	*	*	*
Yeast (1.6%)		*	*	*	*	*
Corn oil (5%)		*	*	*	*	*
Salt (0.2%)		*	*	*	*	*

- Materials ratios on wheat flour basis

Table 2. Formula used in fino bread production

Materials	Trt.	Control	1	2	3	4	5	6	7	8	9	10
wheat flour 72%	25%				*			*			*	
	50%			*			*			*		
	75%		*			*			*			
	100 %	*										
wheat flour 82%	25%		*			*			*			
	50%			*			*			*		
	75%				*			*			*	
	100 %											*
Sugar		*	*	*	*	*	*	*	*	*	*	*
Hemicellulase (0.5%)						*	*	*	*	*	*	
Lecithin (1.0%)									*	*	*	
Yeast (1.6 %)		*	*	*	*	*	*	*	*	*	*	*
Corn oil (5%)		*	*	*	*	*	*	*	*	*	*	*
Salt (0.2%)		*	*	*	*	*	*	*	*	*	*	*

-Materials ratios on wheat flour basis

2.2.5 Pan bread production

Pan bread dough was made according to the previous method for fino bread described by Samar et al. [12] by using flour mixture showed in Table 3.

2.2.6 Physical analysis of pan bread

The average weight (g), volume (cm3) and Specific volume of fino bread ware determined was calculated according to the method of (AACC, [11]).

2.2.7 Sensory evaluation

Ten panelists (4 males and 6 females) from Bread and Pasta department, Food Technology Research Institute (FTRI), Agriculture Research Center, Egypt, were selected to conduct sensory assessment tests. The panelists were specialized in bread and pastries and almost trained to conduct bread sensory evaluation. Sample preparation, testing location and test room environment, were taken into account. Before the test, panelists were given some information on the importance of the experience.

Table 3. Flour mixture used in pan bread production

Materials	Trt.	Control	1	2	3	4	5
wheat flour 72%	25%						
	50%					*	*
	75%		*	*	*		
	100 %	*					
wheat flour 82%	25%		*	*	*		
	50%					*	*
	75%						
	100 %						
Sugar		*	*	*	*	*	*
Hemicellulase (0.5%)				*	*	*	*
Lecithin (1.0%)					*		*
Yeast (1.6 %)		*	*	*	*	*	*
Corn oil (5%)		*	*	*	*	*	*
Salt (0.2%)		*	*	*	*	*	*

- Materials ratios on wheat flour basis

Panelists were re-briefed on use of hedonic scale questionnaire to evaluate the bread. Testing session lasted approximately 15 minutes.

Fino and pan breads were evaluated as the method described by Pyler. [13] through general appearance (10), crust color (10), volume (10), crumb color (20), crumb grain (20), softness (10), taste (10), odor (10) and overall score (100).

2.2.8 Texture analysis

A texture analyzer (BROOKFIELD CT3 TEXTURE ANALYZER Operating Instructions Manual No. M08-372-C0113, Stable Micro Systems, USA) was used to measure the texture profile of pan bread in terms of hardness (N), cohesiveness, Gumminess (N), Chewiness (mj),Adhesiveness (mj), springiness (mm) and Resilience of the samples according to the method described by Gomez et al. [14].

2.2.9 Statistical analysis

The Data were analyzed using CoStat, version 3.03 for personal computers according to Ott. [15]. The tests used were ANOVA test and descriptive statistics test. A treatment effect was assumed to be statistically significant at P < *0.05*.

3. RESULTS AND DISCUSSION

3.1 Chemical Composition

Chemical composition of wheat flour 72%extraction rate (WF 72) and wheat flour 82%extraction (WF 82) are shown in Table (4). The chemical composition of WF 72 and WF 82 are in agreement with the results reported by Kamel. [16], Bedeir. [17] and sharoba et al. [18]. The results showed that WF82 contained higher ratio of protein, crude fiber, ash and ether extract comparing with WF72.

3.2 Effect of Addition Lecithin, Hemicellulase Enzyme on Rheological Characteristics

From results presented in Table 5 it can be noticed that water absorption of WF82 and WF 72 were 66.4% and 64%, respectively. This may be due to high dietary fiber content of WF82 (Sharoba et al. [18]). Addition of lecithin by 1.0% lead to increased of water absorption to 65.7% compared with control (WF 72) . This may be due to the balance of functional groups hydrophilic and lipophilic of lecithin Sakiyan et al. [6]. The results showed also that, addition of lecithin, enzyme and their mixture decreased development time from 2.5 to 1.5 min. From results presented in the same table it can be noticed also that, addition of lecithin, enzyme and their mixture increased the stability of dough. and improved the dough weakening compared with WF 82 and WF 72. This results are agreement with those obtained by Azizi et al. [19] who reported that dough rheological characteristics and baking quality improved with the addition of lecithin. They also found that protein-emulsifier interactions influence the rheology of emulsions.

Results presented in Table 6 showed the effect of addition lecithin, hemicellulase enzyme or their mixtures to dough on extensogram parameters. Data show that, resistance to extension (R) of WF 72 was 280 B.U. Addition of lecithin, enzyme or their mixtures increased in resistance to extension (R) and dough extensibility (E) comparing with WF 72 and WF 82 This results are in agreement with those obtained by Azizi et al. [19].

One of the most significant effects of using wheat flour 82% (WF 82) in the production of French bread is the disruption of gluten network. Fiber prevents the aggregation of gluten proteins,

Table 4. Chemical composition of wheat flour 72% extraction rate (WF 72) and wheat flour 82% extraction rate (WF 82)

Components	WF 72*	WF 82**
Moisture	11.62	12.77
Protein (%)	11.90	12.30
Ether extract (%)	0.63	1.77
Crude fiber (%)	0.29	1.90
Ash (%)	0.63	0.96
Carbohydrates (%)	86.84	83.07
Wet gluten (%)	32.96	21.72
Dry gluten (%)	10.80	7.42
Gluten index	78.00	92.06

Table 5. Effect of addition lecithin, enzyme on farinogram parameters

Blends	Water absorption (%)	Develop. time (min)	Stability (min)	Degree of weakening (B.U)
WF 72	64.0	2.5	10.5	40
WF 82	66.4	2.5	9.0	60
50% WF 72 + 50% WF 82	65	2.0	11	50
50% WF 72 + 50% WF 82 + 1.0% Le	65.7	1.5	12.5	30
50% WF 72 + 50% WF 82 + 0.5% Hm	65.7	1.5	14	30
50% WF 72 + 50% WF 82 + 0.5% Hm +1.0% Le	65.7	1.5	13.5	10

Table 6. Effect of addition lecithin, enzyme and on extensogram parameters

Blends	Resistance to extension R(BU)	Extensibility E (mm)	Proportion Number R/E	Energy (cm2)
WF 72	280	130	2.25	80
WF 82	120	115	1.04	25
50% WF 72 + 50% WF 82	200	115	1.74	55
50% WF 72 + 50% WF 82 + 1.0% Le	320	160	2.0	55
50% WF 72 + 50% WF 82 + 0.5% Hm	320	150	2.13	50
50% WF 72 + 50% WF 82 + 0.5% Hm +1.0% Le	320	160	2.00	98

which results in a lower rise of dough (Noort et al. [20]). In addition, the study of Hartikainen [21] showed that adding wheat bran into dough had a negative impact on the rheological properties of dough, the pasting of starch and the quality of bread. The studies of Damen et al. [22] have shown that bread quality can also be improved by using xylanase enzyme into dough from WF 82 or wheat bran. Both the stickiness and volume of dough increased when raising the dosage of the xylanase enzyme. This was mainly caused by the release of xylo-oligosaccharides.

3.3 Fino Bread Pre-test Evaluation

The results in Table 7 display organoleptic evaluation of the fino breads made as pre-test production by using of (100% WF 72), (75% WF 72 + 25% WF 82), (50% WF 72 + 50% WF 82), (25% WF 72 + 75% WF 82) and (100% WF 82). This pre-test aimed to selecting of unsuccessful fino bread samples and try to increase their quality in the following tests. The fino bread made from WF 72 showed the highest value of overall acceptability. A significant decrease appeared in quality when 75% WF 72 + 25% WF 82 was used followed by other significant decreased when use of (50% WF 72 + 50% WF 82) in the production of fino bread. On the other hand, no significant differences were noticed among fino bread made from 100% WF 82 and 25% WF 72 + 75% WF 82.

3.4 Evaluation of Fino Bread Produced by Using Hemicellulase Enzyme and Lecithin

From the results presented in Table 8 and Fig. 1, it could be noticed that the effect of addition lecithin, hemicellulase enzyme and their mixtures on sensory evaluation parameters had positive effect on fino bread quality and that clearly appear from the statistical analysis for over all acceptability score. No significant difference between fino bread made from (75%WF 72 + 25% WF 82 + hemicellulase) and control sample (100% WF 72), but there are significant difference between fino bread made from (75%WF 72 + 25% WF 82 without enzyme) and control sample (100% WF 72). Also It could be noticed that use of hemicellulase and lecithin improved the quality of fino breads products comparing with those without addition of hemicellulase and lecithin, when use the same flour mixture. On the other hand, lecithin improve quality but with no

Table 7. Sensory evaluation of fino bread production pre-test made by use different blends of WF 72 and WF 82

Score / Product	General appearance (10)	Crust color (10)	Volume (10)	Crumb color (20)	Crumb grain (20)	Softness (10)	Taste (10)	Odor (10)	Overall score (100)
Control 100% WF 72*	9.34 (a)	9.35 (a)	9.34 (a)	19.34 (a)	19.33 (a)	9.33 (a)	9.66 (a)	10.00 (a)	95.68 (a)
75% WF 72 + 25% WF 82**	8.66 (a)	8.66 (a)	8.66 (a)	16.01 (b)	16.00 (ab)	8.68 (a)	8.68 (a)	9.00 (a)	84.34 (ab)
50% WF 72 + 50% WF 82	8.67 (a)	8.33 (a)	8.34 (a)	16.34 (b)	16.33 (a)	7.66 (a)	8.34 (a)	8.33 (a)	82.33 (b)
25% WF 72 + 75% WF 82	7.67 (a)	6.66 (b)	7.65 (a)	13.33 (b)	14.00 (b)	7.66 (a)	8.66 (a)	8.00 (a)	76.00 (c)
100% WF 82	7.66 (a)	7.67 (ab)	7.66 (a)	13.33 (b)	13.67 (b)	8.00 (a)	8.33 (a)	8.00 (a)	74.33 (cd)
L.S.D* **	**1.3286**	**1.328**	**1.7575**	**2.4856**	**2.9334**	**1.2427**	**1.328**	**2.100**	**10.895**

** WF 72 : Wheat flour 72% extraction rate, ** WF 82: Wheat flour 82% extraction rate, *** LSD : Low significant difference, Mean values in the same column followed by different subscript letters are significantly different at P <0.05*

significant difference between samples made by using hemicellulase enzyme or using hemicellulase enzyme and lecithin in the same flour mixtures. Katina [23] investigated that Negative effects were notable when the amount of added wheat bran was 10-20%. This gave more than 6 % total fiber in bread. The studies of Damen et al. [22] had shown that bread quality can also be improved by using wheat bran and xylanase into dough. Both the stickiness and volume of dough increased when raising the dosage of the xylanase enzyme. This was mainly caused by the release of xylo-oligosaccharides.

Fig. 1. Fino bread made by using hemicellulases and lecithin in different blends of WF 72 and WF 82

**WF 72: Wheat flour 72% extraction rate **WF 82: Wheat flour 82% extraction rate*
****Hm.: Hemicellulose enzyme ***Le: lecithin*

Table 8. Sensory evaluation of fino bread by using Hm and Le in different blends of WF 72% and WF 82

	Score / Product	General appearance(10)	Crust color 10)	Volume (10)	Crumb color (20)	Crumb grain(20)	Softness (10)	Taste (10)	Odor (10)	Overall score(100)
1	Control (100% WF 72*)	9.66 (a)	9.33 (a)	9.66(a)	19.66(a)	19.33 (a)	10.00 (a)	9.66 (a)	10.00 (a)	97.33 (a)
2	75% WF 72 + 25% WF 82**	9.00 (a)	8.66 (ab)	8.33 (ab)	18.00(ab)	18.66 (a)	8.66 (b)	9.00 (a)	9.00 (a)	90.66 (b)
3	50% WF 72 + 50% WF 82	6.66 (b)	7.00 (c)	6.66 (b)	13.00 (c)	13.66(b)	6.33 (d)	9.00 (a)	8.00 (ab)	70.33 (c)
4	25% WF 72 + 75% WF 82	5.66 (b)	6.66 (c)	5.66 (b)	13.33 (c)	12.66(b)	6.00 (d)	8.33(ab)	6.33(b)	64.66 (d)
5	75% WF 72 +25% WF 82+ Hm***	9.33 (a)	8.66 (ab)	9.33 (a)	18.33(a)	18.66(a)	9.33 (ab)	9.33(a)	9.66 (a)	92.66 (ab)
6	50%WF 72 + 50% WF 82 + Hm	8.33 (a)	8.6 6(ab)	8.33 (a)	17.00 (b)	16.66 (a)	9.00 (b)	9.66 (a)	9.33(a)	87.00 (b)
7	25% WF 72 + 75% WF 82 + Hm	6.00(b)	6.66 (c)	5.66 (b)	13.66 (c)	12.66 (b)	6.00 (d)	8.33 (ab)	6.66 (b)	65.66 (cd)
8	75% WF 72 + 25% WF 82 + Hm + Le****	9.66 (a)	9.00 (a)	9.33 (a)	18.66 (a)	18.00(a)	9.33 (ab)	9.33(a)	9.33 (a)	92.66 (ab)
9	50%WF 72 + 50% WF 82 + Hm + Le	8.66 (a)	8.66 (ab)	8.66 (a)	17.3(b)	18.33 (a)	8.33 (b)	9.33(a)	9.33 (a)	88.66(b)
10	25% WF 72 + 75% WF 82 + Hm + Le	6.33 (b)	5.66 (c)	6.33 (b)	12.00(c)	12.66 (b)	7.33 (c)	9.00(a)	8.33 (a)	67.33(cd)
11	100 WF 82	4.00(c)	3.33 (d)	3.66 (c)	9.00 (d)	7.33 (c)	5.00 (e)	7.66(b)	6.33 (b)	46.33(e)
L.S.D		**1.3182**	**1.3184**	**1.1029**	**1.3507**	**2.5184**	**0.7220**	**0.8337**	**1.3182**	**3.9984**

** WF 72: Wheat flour 72% extraction rate ** WF 82: Wheat flour 82% extraction rate *** Hm.: Hemicellulase enzyme ***Le: lecithin*
**** LSD : Low significant difference, Mean values in the same column followed by different subscript letters are significantly different at P <0.05*

Depending on the results displayed on Table 8 and overall score statistical analysis, Six fino bread samples from eleven had (a, ab, and b) marks, It were considered as the higher produced fino bread quality comparing with control sample (first and second grades). These five samples ingredients were used for production of pan bread for more evaluation analysis in the following tables.

3.5 Evaluation of Pan Bread Produced by Using Hemicellulase Enzyme and Lecithin

3.5.1 Sensory evaluation

The following five flour mixtures were used for pan bread production: (100% WF 72), (75% WF72 + 25% WF82), (75% WF72 + 25% WF82+ Hm), (75% WF 72 + 25% WF82 + hemicellulase + lecithin), (50% WF 72 + 50% WF 82+ hemicellulase) and (50% WF 72 + 50% WF 82 + hemicellulase + lecithin). As presented in Table 9 and Fig. 2, overall score, general appearance, odor and taste recorded no significant difference between pan bread samples, but there are significant differences between samples in crust color, volume, crumb color, crumb grain and softness and that's due to use WF 82 which include wheat bran.

3.5.2 Physical properties

Data presented in Table 10 and Fig. (2) show that enzyme increased volume and specific volume of loaves. Pan bread made from WF 82 decreased the volume and specific volume of loaves. On the other hand, addition of hemicellulase enzyme and lecithin or their mixture increased specific volume of loaves from 3.11 to 3.5 in 75% WF 72 + 25% WF 82 sample. An significant difference appear clearly in volume and specific volume when use hemicellulase enzyme and lecithin or their mixture when use 75% WF 72 + 25% WF 82 or 50% WF 72 + 50% WF 82. This results are in agreement with those reported by (Sakiyan et al. [6]) who mentioned that the volume yield can be increased considerably by adding hemicellulases enzyme which are only present in minor amounts in flour. The beneficial effect of hemicellulases (an enzyme family comprising pentosanases, xylanases and other enzymes acting on hemicellulases) on dough properties and the volume yield of baked bread was proofing.

Wheat bran is resistant to hydrolysis and thus a poor substrate for fermentation by microorganisms. By using low levels of enzymes such as cellulases and hemicellulases, wheat bran fibers were able to hydrolysed further hydrolysed to glucose by glucosidases. Arabinoxylan chains are hydrolysed by hemicellulases such as xylanases in the endo position (Sunna and Antranikian, [24]).

These results are in agreement with those reported by Demirkesen et al. [7] who mentioned that, emulsifiers such as lecithin were necessary to obtain the desired physical properties and specific volume in dough.

3.5.3 Texture analysis

Data presented in Table 11 showed the effect of addition Lecithin and hemicellulase enzyme to production of pan bread made from (WF72) and (WF82) decreased hardness measurement. Addition of lecithin and hemicellulase on treatments decreased hardness value of comparing with control sample. Meanwhile, addition of lecithin record the lowest value of hardness of pan bread was 10.13 N/mm. These results agree with, Arendt and Moore [25] reported that the complex structure formed between the emulsifier and starch may improve bread staling.

The effect of lecithin and hemicellulase to produce pan bread decreased cohesiveness, resilience and gumminess comparing with control sample. Must be explained by the different chemical interactions between oil, protein and starch that affect its retrogradation according to Martin et al. [26] suggested that interactions between the swollen starch granules and the protein network actively contribute to crumb firming, the same results were found by Sakiyan et al. [6]. Many researchers have shown in their studies that protein-emulsifier interactions influence on the rheology of emulsions. It is remarkable the lack of any clear relationship between pan bread water contents and its firmness. Decreased crumb firmness did not improve crumb texture, which showed increased crumbliness. Crumb structure of gluten-free bread is distorted at high emulsifier concentration probably due to interference of the emulsifiers with the functionality of starch granules or because the emulsifiers are dependent on the level or nature of protein in the flour Nishita et al. [27]. Also Demirkesen et al. [7] reported that addition of lecithin improved significantly the firmness of bread.

Table 9. Sensory evaluation of pan bread made by using hemicellulases enzyme and lecithin in different blends of WF 72 and WF 82

	Score / Product	General appearance(10)	Crust color(10)	Volume (10)	Crumb color(20)	Crumb grain(20)	Softness (10)	Taste (10)	Odor (10)	Overall score(100)
1	Control (100% WF 72*)	9.66 (a)	9.33 (a)	9.66(a)	19.66(a)	19.33 (a)	10.00 (a)	9.66 (a)	10.00(a)	97.33 (a)
2	75% WF 72 + 25% WF 82**	9.33 (a)	8.66 abc)	9.33 (a)	18.33 (a)	18.66 (a)	9.33 (ab)	9.33 (ab)	9.66 (a)	92.66 (ab)
3	75% WF 72 + 25% WF 82 + Hm***	9.66 (a)	9.00 (ab)	9.33 (a)	18.66(a)	18.00 (a)	9.33 (ab)	9.33(ab)	9.33 (a)	92.66 (ab)
4	75% WF 72% + 25% WF 82 + E + Le****	9.00(a)	8.66(abc)	8.66 (ab)	18.00 (a)	17.33 (a)	8.33 (bc)	9.00 (abc)	9.00 (a)	88.00 (abc)
5	50% WF 72 + 50% WF 82 + Hm	8.33 (a)	8.33(abc)	7.33 (bc)	15.66 (b)	17.66 (a)	8.33 (bc)	9.00 (abc)	9.00 (a)	83.66 abcd)
6	50% WF 72 + 50% WF 82+ Hm + Le	7.66 (ab)	7.00(bcd)	6.00 (c)	15.66 (b)	14.00 (b)	8.33 (bc)	8.00 (bc)	8.33 (ab)	73.66 abcd)
L.S.D		**1.214**	**1.384**	**1.012**	**2.377**	**1.5184**	**1.472**	**1.025**	**1.423**	**4.214**

** WF 72: Wheat flour 72% extraction rate, ** WF 82: Wheat flour 82% extraction rate*
**** Hm. : Hemicellulase enzyme, ****Le : lecithin, *** LSD : Low significant difference*
Mean values in the same column followed by different subscript letters are significantly different at P <0.05

Table 10. Effect of addition hemicellulases enzyme and lecithin on physical properties of pan bread

Product	Weight (g)	Volume (cm3)	Specific volume (cm3)/g
Control (100% WF 72*)	153.23 g (ab)	453.0 cm^3 (d)	2.95 (d)
75% WF 72 + 25% WF 82**	154.01 g (a)	479.6 cm^3(c)	3.11(c)
75% WF 72 +25% WF 82 + E***	151.48 g (b)	520.0 cm^3(ab)	3.43 (a)
75% WF 72% +25% WF 82 + E + L****	151.54 g (b)	531.0 cm^3(a)	3.50 (a)
50% WF 72 +50% WF 82 + E	152.96 g (ab)	488.6 cm^3(c)	3.19 (c)
50% WF 72% +50% WF 82 + E + L****	153.4 g (ab)	510.0 cm^3(b)	3.32 (b)
L.S.D	**1.412**	**14.501**	**0.092**

** WF 72: Wheat flour 72% extraction rat ** WF 82: Wheat flour 82% extraction rate*
**** E. : Hemicellulase enzy ****L : lecithin, *** LSD : Low significant difference*
Mean values in the same column followed by different subscript letters are significantly different at P <0.05

Table 11. Texture analysis of pan bread made by using hemicellulases enzyme and lecithin in different blends of WF 72 and WF 82

	Product	Hardness	Cohesiveness	Resilience	Springiness	Gumminess	Chewiness
1	Control (100% WF 72*)	10.57	0.46	0.13	2.24	4.84	10.80
2	75% WF 72 +25% WF 82**	10.94	0. 50	0.14	2.15	4.95	9.70
3	75% WF 72 + 25% WF 82 + E***	10.38	0.44	0.12	2.46	4.58	11.60
4	75% WF 72% + 25% WF 82 + E + L****	10.13	0.40	0.10	2.66	4.33	12.90
5	50% WF 72 + 50% WF 82 + E	10.55	0.46	0.13	2.36	4.65	11.80
6	50% WF 72 + 50% WF 82+ E + L	10.17	0.42	0.11	2.56	4.37	12.60

** WF 72: Wheat flour 72% extraction rate , ** WF 82: Wheat flour 82% extraction rate, *** E. : Hemicellulase enzyme. ****L : lecithin*

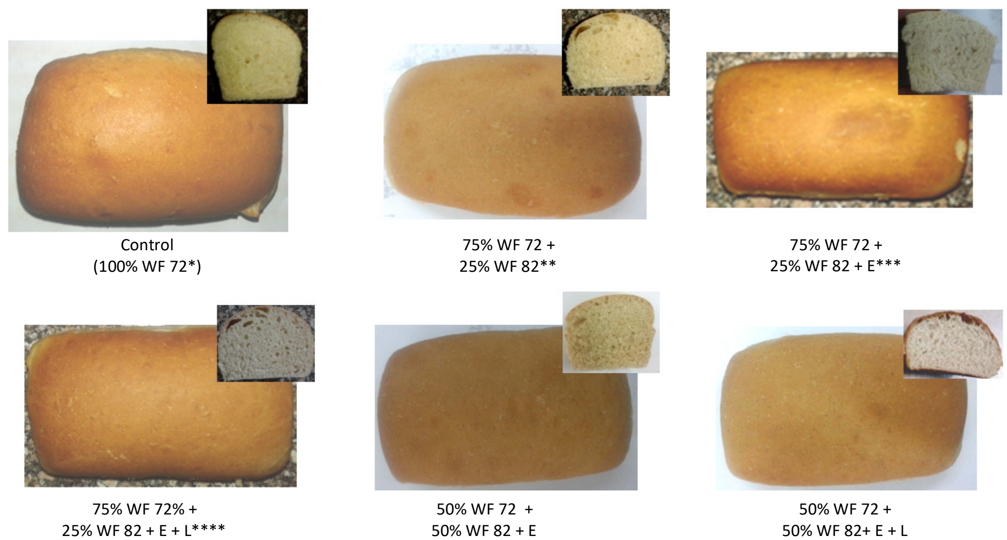

Fig. 2. Pan bread made by using hemicellulases enzyme and lecithin in different blends of WF 72% and WF 82%extraction

**WF 72: Wheat flour 72% extraction rate, **WF 82: Wheat flour 82% extraction rate*

****E. : Hemicellulase enzyme, ****L: lecithin*

4. CONCLUSION

The focus of this study were to produce and evaluate of high quality fino bread by using the higher ratio of wheat flour 82%. In conclusion use of 50 %WF72 + 50% WF82 with 0.5% Hm + 1% Le and use of hot water (90ºC) to make dough lead to introduce high quality fino and pan breads. This results can used easily in the Egyptian Bakery pilot plants to arrive strategic goal of Egyptian government.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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