J. Agric. Sci. Mansoura Univ., 31 (12): 7753 - 7764, 2006

AN ATTEMPT TO IMPROVE THE QUALITY OF PIZZA

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ABSTRACT

For many years, Pizza has become a wide spread bakery product in Egypt, the work reported herein concerns with improving yeast-leavened bread like Pizza for the appearance, grain and texture, chewing and flavor at levels of 10, 20 and 30% replacement of wheat flour by maize one.

These flour mixtures were incorporated with settled coagulated skimmed milk (Rayeb Milk) at a level giving the best dough texture. These levels are shown in the text interior.

Doughs were tested for loss in moisture just after baking leaving unpacked for 1 hr and stored packed till spoilage at room temp to be examined daily. Packed Pizza was also examined when stored at 5°C at intervals of 3 days till spoilage.

Resultant Pizzas were also evaluated for their over run, baking time, weight & diameter for a fixed weight of dough, sensory properties, and shelf-life. Levels of 10 and 20% replacement decreased moisture loss, baking time; but increased over run, loaf weight and diameter. These estimates were decreased in magnitudes when replacement was increased to 30%.

Ten and twenty percent replacement improved the appearance, grain and texture, chewing and flavor than the 30%. However, the 20% was the most well distinguished ratio, added to its best evaluated nutritional value.

INTRODUCTION

The protein malnutrition represents a great risk in poor or undeveloped countries than those of rich and developed countries; Brabin_et al (2001). The protein intake depends on the quality of protein in the diet; Donald and David, (1976). Overcome this malnutrition in animal proteins in human diets as a result of depending mainly on bread in undeveloped countries or among those depending on takeaways daily for a long time; the use of milk products and by products in bakery industry can solve this problem. The work reported herein concerns with improving Pizza the physical and physicochemical properties of Pizza by partially alteration of wheat flavor and all mixing water by maize flavor at ratios of 10, 20 and 30% and settled coagulated milk (Rayeb Milk);fermented coagulated residue part of milk after removing the settled cream layer including 1-1.3% fat, 3.2-4.4% protein, 3.5-4.3% lactose, 0.60 – 0.85% ash and 1.0-1.5% lactic, acetic, formic, propionic and glutamic acids produced by hetero-homo fermentative lactic acid that naturally implicated in this milk. These compounds share in the final product's flavor and prolonging the shelf-life of the produced Pizza. The allergy risk of wheat gluten, there is also the health benefits of lactic acid bacteria with allergy risks of lactose and milk proteins; the latters contain considerable ratio of orotic acid known with its curable action related with heart diseases. Sellars, (1989). This curable acid has been detected in milk bread at a concentration of 5 mg/Kg, Bui, (1989), Hunt *et al.*, (1991) reported that using moderate and high

amount of protein from casein enhanced human absorption of zinc from whole-wheat or white rolls.

Whole maize flour containing considerable fibers and oil more than those of wheat flour have the ability to reduce the energy density of foods, Stevens *et al.*, (1987). These fibers resist the digestive secretions in the upper gastrointestinal tract, Heaton, (1980) and that in turn decrease energy density for the purpose of controlling body weight. Also organic acids play an important role in increasing water absorption of the dough while stability to mixing were decreasing; Westover (1980). Adding fiber material to wheat flour increased water absorption; while the loaf volume decreased, Ibraheim *et al.*, (1990). The water absorption of flour is an important factor influencing the handling properties, Catterall, (1998).

Both maize flour and milk proteins are considerable agents in increasing water absorption and increase water retention in bread and in turn increase the overrun casein in milk also improved the handling properties of the dough and chewness, Silaula *et al.*, (1989) reported that the high protein fraction used as a substituant for bread flour in dough at levels of 10, 15 and 20% increased water absorption, arrival and dough development time; while the dough stability decreased. The baking quality of bread such as loaf volume, internal and external characteristics were impaired.

MATERIALS AND METHODS

Ingredients:

Hard wheat flour (72% extraction) was obtained from North Cairo Mills Company. Maize flour was obtained from stone mills; the latter was used at ratios of 10, 20 and 30% replacement. Sugar, salt (sodium chloride), compressed baker's yeast, corn oil and fresh eggs were obtained from the local market, Tanta City; Egypt. Settled Coagulated Skimmed Milk (Rayeb Milk) was obtained by the traditional method used in rural houses.

Preparing pizza dough:

Salt and sugar are dissolved both at a ratio of 2% w/w of flour in a little amount of warm mixing water and the compressed bakers' yeast was also dissolve at a ratio of 4% of flour in a little warm water and let sit for 10 minutes, margarine and corn oil were combined at a ratio of 5% with whole eggs and sifted wheat flour 72% extraction then the other ingredients for the control and all the ingredients for the treatments were blended with sifted maize flour at ratios of 10, 20 and 30% replacement. Mixing tap water was added for the control and Rayeb Milk for the treatments till giving the best dough texture as illustrated in table (1).

Table (1) demonstrates the formula of the Pizza dough and the treatments according to Khater and Helal (2002) with some modifications as illustrated in the same table (replacing mixing water by Rayeb Milk and wheat flour partially by maize flour at ratios of 10, 20 and 30% substitution.

All combined ingredients were stirred or knead (hand mixed) for 5 min. until strechened or giving best dough texture, then let rest in a warm place for an hour for leavening. The leavened dough was divided into equal balls (200 gm) and let sit for further leaven for half an hour, then rolled and left for

another 30 min. at the ambient temp. The leavened rolled balls were baked in the home gas baking oven at 250-280°C. For 3.5 -5.5 min., the time was determined by stopwatch. Doughs were weighed just after baking to determine the loss in moisture during baking and rested at room temp. for an hour then reweighed to determine the same estimate during cooling. Pizza loaves were packaged in clean and dry polyethylene sucks and kept in a refrigerator (3-5°C) and at the ambient temperature (18-35°C) which in turn has been checked daily for the samples stored at room temp. and every 3 days for those stored at 3-5°C.The samples weighed during storage periods to determine the loss in moisture during storage and shelf-life.

Table (1): Ingredients Used in Making Pizzas Dough (g).

Ingredients%		Control	10%	20%	30%
Flour	Wheat 72%	100	90	80	70
	Maize	-	10	20	30
Mixing solution	Water	65	-	-	-
	Rayeb Milk	-	90	120	100
Whole eggs		10	10	10	10
Corn oil and margarine		5	5	5	5
Sugar		2	2	2	2
Sal		2	2	2	2
Yeast		4	4	4	4

Over run:

The over run % was calculated according to El-Gammal (2001) by the following formula:

$$\text{Over run} = \frac{Wt - Wc}{Wc} \times 100$$

Where:

Wt = The weight of treated pizzas

Wc = The weight of control pizza.

Organoliptic evaluation:

The fresh and stored loaves were investigated by 10 panelists for eating quality, external and internal characters and texture according to El-Nemr (1976) with some modifications.

Some of the produced Pizzas of the control and treatments were dried in an air oven at 60°C for 6 hrs. then grind in a dry clean porcelain mortar and kept in sealed polyethylene sacks under cooling for chemical analysis.

Chemical analysis:

The used raw ingredients (wheat and maize flour, whole eggs ,settled coagulated Milk, fresh and grinded Pizza loaves were analyzed for moisture, crude protein, ash, and, fibers according to the AOAC Official Methods (1995), fat and acidity of the settled Coagulated Milk were performed according to Ling (1963). The total carbohydrates were calculated by differences.

RESULTS AND DESCUSSION

Table (2) presents the chemical composition of macro components of the main ingredients used in Pizza doughs.Resultant data of wheat flour components have agreed with those of Abd El-Hady *et al.*, (2002) and Khalil (2002) for protein, ash and crude fibers respectively. Protein, fat, ash, crude fibers and total carbohydrates of the maize flour have also agreed with the same estimates of El-Gammal (2001). On the other hand, both titratable acidity and pH value of Rayeb Milk have an agreement with the same estimates of Abd El-Moneium (1978).

Table (2): Gross Chemical Composition pH and Acidity of the Used Flour, Rayeb Milk and Whole Eggs

Ingredients		Moisture	Protein	Fat	Ash	Crude fibers	*Total. carbo-hydrates	pH	** Acidity
Flour	Wheat 72%	12.40	1.20	0.85	0.61	0.56	74.38	-	-
	Maize	10.65	9.94	4.35	1.27	1.40	72.39	-	-
Rayeb Milk		89.60	3.72	1.2	0.75	-	4.93	5.02	1.15
Whole eggs		73.20	13.10	12.10	0.94	-	0.67	-	-

*** Total carbohydrates calculated by difference.**
**** As lactic acid.**

Table (3) discloses the loss in moisture during and just after baking and storage as a result of blending wheat flour with maize one and substituting mixing water by Rayeb Milk as illustrated ratios in table (2).Regardless of resultant data of the treatment 30%; there was a reduction in this loss which was related to the lipid interaction as a binding substance by flour proteins as a result of substituting wheat flour by maize one, and may be related to the increase of water absorption by increasing the maize flour contains higher content of fibers as indicated in Ibrahim *et al.*, work (1990).

Moreover, the interaction of milk protein with flour starch during baking and starch gelatinization increasing water retention of the produced bread, these results are in accordance with those reported by Dreese *et al.*, (1988) who found that the high protein levels 10, 15 and 20% in the dough; water absorption, arrival and dough development time increased.

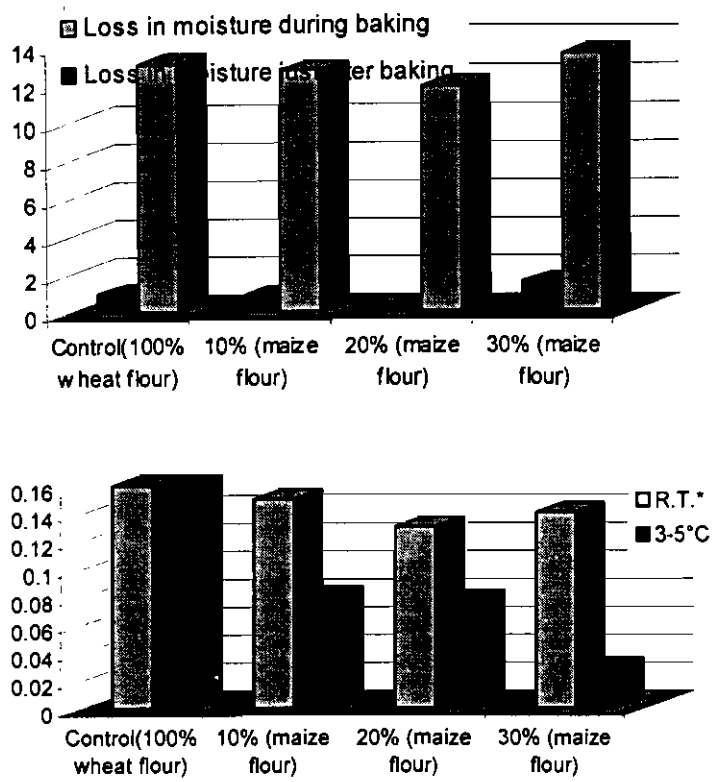

Figure (1, a-b)

Data in table (4) and Figure(1,a-b)illustrates the fairly increase in the overrun, loaf weight and diameter and shelf-life Except for the treatment 30% replacement by maize flour; all parameters reveal a considerable increase in loaf weight and diameter and shelf-life; the enhancement of the latter parameter was due to the indigenous lactic acid bacteria in both flour and Rayeb Milk increasing acidity that in turn inhibited many other spoilage organisms present in the final product during storage and prolong shelf- life by 1.25 and 4.75 days at both room temp. and refrigerator respectively. This result has an agreement with those of Kumar & Raccach (1996). The highest average value of shelf-life was achieved by the treatment 20% replacement as shown from the same table which was related to the anti fungi and antibiotics by some species of homo-hetero fermentative lactic acid bacteria naturally implicated Rayeb Milk which share in acceptable flavor inhibit and some aerobic and an aerobic bacteria and some fungi. These obtained data are relatively similar to those of (Odame Darkwh and Marshall, 1993) and (Huttunen *et al.*, 1995). The presence of citric and lactic acids in the used naturally fermented dairy product and the forming ones during fermentation of the dough prevent the formation of mycotoxins in the produced Pizzas along the shelf-life on both ambient temp. and cold storage as reported by (Reiss,1976) and (Barber *et al.*, 1992).

Table (3): Effect of Blending Maize Flour and (Rayeb Milk) on Loss in Moisture During and Just After Baking and Storage.

Treatments		Control(100% wheat flour)			10% (maize flour)			20% (maize flour)			30% (maize flour)		
Central value and dispersion		Mini	Max	Average	Mini	Max	Average	Mini	Max	Average	Mini	Max	Average
Loss in moisture during baking		4.75	17.17	13.02	8.46	16.29	12.67	6.46	16.04	11.83	9.74	16.28	13.55
Loss in moisture just after baking		0.343	1.40	1.00	0.47	2.07	0.87	0.30	2.44	0.25	0.69	1.56	1.56
Loss in moisture during storage	R.T.*	0.08	0.19	0.16	0.07	0.20	0.15	0.12	0.14	0.13	0.10	0.18	0.14
	3 - 5 °C	0.123	0.198	0.16	0.010	0.12	0.08	0.020	0.056	0.077	0.022	0.036	0.029

R.T. = Room temperature (18-35°C)

Table (4): Effect of blending maize flour and Rayeb Milk on some loaf characters, baking time, overrun and shelf-life

Treatments	Central value and dispersion	Over run	Loaf weight	Loaf diameter	Baking time	Shelf-life in days	
		%	(gm)	(Cm)	(min)	R.m.*	3-5°C
Control(100% wheat flour)	Minimum	0.00	163.185	22.00	4.00	2.00	14.00
	Maximum	0.00	170.281	23.00	5.50	3.00	19.00
	Average	0.00	166.578	22.40	4.50	2.75	16.50
10 % (maize flour)	Minimum	1.790	163.265	21.50	3.50	2.00	18.00
	Maximum	1.969	170.715	23.00	4.00	4.00	23.00
	Average	1.876	167.644	22.25	3.63	3.00	20.00
20% (maize flour)	Minimum	6.025	160.218	21.50	3.50	3.00	2.00
	Maximum	6.150	173.964	23.00	4.00	5.00	24.00
	Average	6.048	169.413	22.60	3.62	4.00	21.25
30% (maize flour)	Minimum	2.241	165.050	21.00	3.00	3.00	20.00
	Maximum	2.630	171.279	23.00	4.50	5.00	22.00
	Average	2.431	167.422	22.10	3.70	3.75	20.75

* Room temperature, (18-35°C)

A profoundly increase in overrun reached to more than 16% observed by the treatment 20% replacement; this highly increase in overrun considering an economic benefit in reducing the cost of is often related to the higher product content of fibers in maize flour that increase water absorption in the dough and the wheat flour gluten affects in Pizza quality as refer in the work of O"halloran and Dwyer,(1997)and the effect of flour blending on the physico-chemical and sensory qualities and nutrients increasing fat, protein and fibers increasing nutrient vales and consumption as indicated in the work of Iwuha *et al.*(1997). Moreover the interaction of milk protein with flour starch during baking and starch gelatinization increasing water retention in the produced product. also the lipid interaction as a binding substance by flour protein during the development of the dough and the increasing water absorption by maize flour caused by the strong water binding ability of fibers. These findings had an accordance with the previous work of (Ibrahim *et al.*, 1990),) and (Carr *et al.*, 1992) respectively. On the other hand, there was a remarkable decrease in baking time also representing another lowering in the production cost of Pizza.

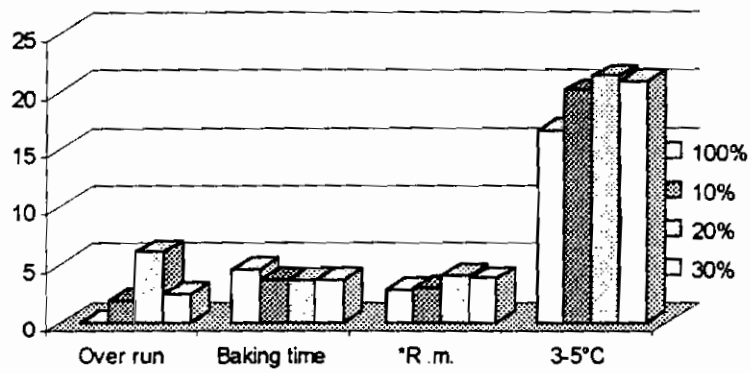

Figure (2) Shelf-life in days

Data in table (5) and Figure(2) shows the fairly improvement in organolyptic properties of the baked Pizza doughs. Eating quality, external surface and crumb color reviled good scores for the ratios 10 and 20% replacements. Meanwhile the cross section improved only with 10% replacement and the grain & texture improved with 20% replacement. The pleasant crust character, crumb color and the highest acceptable quality in flavor, chewing, external surface, crust character, crumb color, grain & texture and total score have been achieved by the treatment 20% replacement scoring 4.75, 4.80, 8.80, 4.8, 8.75, 4.4 and 43.8 degrees respectively. Flavor enhancement was related to lactic acid fermentation that increased both inosinic and glutamic acids. These results coped with those of Fujisawa & Yoshino (1995).).

The porosity or gas vesicles observed from the cross- section in 20% treatment were fairly small and relatively uniform by increasing the added maize flour the high absorption levels are important to give adequate porosity of the crumb. These results are in a good agreement with those of Srivastava

& Haridas Ras,(1993) and Gelinase *et al.*, (1995).Regardless of crumb color and flavor; the other organoliptic estimates of the ratio 30% replacement showing lower score. This adverse effect may be as a result of increasing fibers from maize flour and the dilution of the functional gluten protein that decreased loaf volume, Pomeranz *et al.*, (1997), they indicated that the addition of 5% fibers decreased the loaf volume. The adulteration of mixing water by Rayeb Milk enhanced the organolyptic properties of the produced Pizzas and share in the pleasant taste produced from the combination of enzymes naturally present or found by lactic acid bacteria /yeast fermentation (Proteinases, analyses, lipoxygenases, carbohydrate fermentation, metabolism of N compounds and other substrates during bread baking) as indicated by Martinz Anaya, (1996).

Table (5): Organoleptic Properties of Pizza Produced by Incorporating Maize Flour and Rayeb Milk with the Used Ingredients.

Treatment	Central value and dispersion	Eating quality		External surface	Crust character	Crumb color	Grain and texture	Cross section	Total score
		Flavor	Chewing						
		(10)	(5)	(10)	(5)	(5)	(5)	(10)	(50)
Control (100% wheat flour)	Minimum	70	3.0	7.0	4.0	4.0	4.5	7.0	36.5
	Maximum	10.0	5.0	9.0	4.0	4.5	4.0	9.0	45.5
	Average	8.0	4.0	8.0	4.0	4.1	4.3	8.0	40.4
10% (maize flour)	Minimum	8.0	4.0	8.0	3.0	4.0	3.5	7.0	37.50
	Maximum	9.0	5.0	10.0	4.0	4.5	4.0	9.0	45.50
	Average	8.3	4.3	8.5	3.1	4.13	3.9	8.3	40.53
20% (maize flour)	Minimum	8.0	4.0	8.0	4.0	4.0	4.0	7.0	39.0
	Maximum	9.0	5.0	9.0	5.0	5.0	4.5	8.0	45.5
	Average	8.8	4.8	8.75	4.75	4.8	4.4	7.5	43.8
30% (maize flour)	Minimum	8.0	3.0	7.0	3.0	4.0	3.5	6.0	34.5
	Maximum	9.0	4.0	8.5	4.0	5.0	4.0	7.0	41.5
	Average	8.1	3.8	7.6	3.3	4.3	3.6	6.5	37.2

Table (6) presents the contribution of protein, fat, ash and energy of the Pizzas to the daily requirements for children from 4 to 10 years. Obtained data showed that the these contributions to the daily requirements for children from (4 to 10 years) of protein increased from 51.67% to 61.92% for children from 4-6 years and from 44.29% to 53.07% for those from (7-10years), while ash contents have contributed at ratios ranged from 38.29% to 95.43% for children from (4-6years) and from 37.22% to 92.78% for those from (7-10 years) respectively up to 30% replacement of maize flour. These contributions for fat achieved 14.40% for the control and increased to 32.13% for the treatment 30% replacement for both males and females alike.

The fat content of the produced Pizzas contributed average values ranged from 14.40 to 32.13% for both adult males and females alike. Likely the calculated energy contributed to these daily requirements by considerable levels reached to 10.80 and 14.58% for the treatment 30% substitution for the adult mails and females respectively.

Table (7) presents the contribution of the main components of the produced Pizza to the daily requirements for the adult males and females.

Table (6): Contribution of protein, ash and energy of the produced Pizzas to the daily requirements for children from (4 -10 years).

Components%	Treatments %				Daily nutritive requirements for children from 4- 10									
	Control	10	20	30	4-6 years	Treatments %				7-10 years	Treatments %			
						Control	10	20	30		Control	10	20	30
Protein	12.40	14.50	14.86	14.35	24gm*	51.67	60.42	61.92	59.79	28gm	44.29	51.79	53.07	51.25
Ash	0.67	1.23	1.46	1.67	1.75mg*	38.29	70.28	83.43	95.43	1.80mg	37.22	68.33	81.11	92.78
Fat	2.16	3.40	3.77	4.82	20 gm**	10.80	17.00	18.85	24.10	20 gm	10.80	17.00	18.85	24.10
T.* carbohydrates	51.65	47.64	46.52	47.72	-	-	-	-	-	-	-	-	-	-
Crude fibers	0.40	0.43	0.56	0.77	-	-	-	-	-	-	-	-	-	-
Moisture	32.72	32.80	32.83	30.67	-	-	-	-	-	-	-	-	-	-
Energy kcal	275.64	279.16	279.37	291.66	1800	15.31	15.51	15.52	16.20	2000	13.78	13.96	13.97	14.58

Control= 100% wheat flour Treatments=10%,20% and 30% maize *Recommended Ditary Allowances, 10 th Edition (1989)

** Recommended Ditary Allowances for Indians Swaminathan (1993).

Table (7): Contribution of the main components of the produced Pizza to the daily requirements for adult males and females .

Components%	Treatments %				Daily nutritive requirements for children mails and females									
	Control	10%	20%	30%	Males	Contribute % per 100gm				Females	Contribute % per 100gm			
						Control	10%	20%	30%		Control	10%	20%	30%
Protein	12.40	14.50	14.86	14.35	63gm	19.68	23.02	23.59	22.78	50gm	24.80	29.00	29.72	28.70
Ash	0.67	1.23	1.46	1.67	1.98gm	33.84	62.12	73.74	84.34	1.91gm	35.08	64.39	76.44	87.43
Fat	2.16	3.40	3.77	4.82	15gm	14.4	22.67	25.13	32.13	15gm	14.40	22.67	25.13	32.13
Total carbohydrates	51.65	47.64	46.52	47.72	-	-	-	-	-	-	-	-	-	-
Crude% fibers	0.40	0.43	0.56	0.77	-	-	-	-	-	-	-	-	-	-
Moisture %	32.72	32.80	32.83	30.67	-	-	-	-	-	-	-	-	-	-
Energy kcal	275.64	279.16	279.37	291.66	2700kcal	10.20	10.36	10.35	10.80	2000kcal	13.78	13.96	13.97	14.58

Control= 100% wheat flour Treatments=10%, 20% and 30% maize] *Recommended Ditary Allowances, 10 th Edition (1989)

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Protein content covered ratios ranged from 19.68 to 23.59% and from 24.80 to 29.72% for the control and 20% replacement respectively. These contributions of fat and ash ranged from 14.40 to 32.13 % and 33.84 to 84.34% respectively for adult males and from 14.40 to 32.13 % and 35.08 to 87.43% for the adult females form the control to the treatment 30% replacement.

REFERENCES

Abd El – Hady, E.A Shouk, A.A and Yaseen, A.A.E. (2002): Effects of lipids and emulsifiers on frozen bread dough quality. Egypt. J. Food Sci. 30(1): 77-97.

Abdel – Moneim, R.B. (1978): Studies on the nutritional value and hygienic conditions of fermented milks. Thesis, HIPH, Alexandria, Egypt.

AOAC, (1995): Official Methods of analyses 12th ed. Published by the Association of Official Analytical Chemists, S Washington, D.C.

Barber, B.; Drotola, C.; Barber, S. and Fernandez, F. (1992): Storage of packaged white bread. III. Effect of sour dough and addition of acids on bread characteristics. Zeitschrift fur Lebensmiltel – Unter Suchung und – Forschung 194 (4) 442 – 449.

Brabin, B.J., Premja, Z.and Verhoeff., F. (2001). An analysis of anemia and child mortality. J.Nutr.131 (25):6465-6485.

Bui, L.V. (1989): Determination of orotic acid by liquid chromatography a criterion for calculating non fat milk solids in milk bread. Journal of the association of official analytical chemists, 72(4) 627-631.

Carr, N.N.; Daniels, N.W.R. and Prazier, P.J. (1992): Lipid interactions in bread making. (Review) CRC critical reviews in Food Science and Nutrition 31 (3) 237 – 258.

Catterall,P. (1998):Flour milling pages 296-329 in:Technology of Bread Making S.P.Cauvain and L.S.Young, eds.Blackie Academic and Professional: London.

Donald, S . Maclaren and David, B.F. (1976): Keginald lightwood. Text book of pediatric nutrition, C.F. Bakier, M.M. (1986). M.Sc. of childhood studies, (M.B., B.Ch.) Fac of Agric. Ain Shams Univ.

El-Gammal (2001): Using of acidic whey and buttermilk to enrich the peasant's bread. 1. Evaluating of physiochemical and sensory characteristics.J. Agric.Res.Tanta Univ., 27(3)2001.

El-Nemr, K.M. (1976): Investigation of the effect of various grain meals that could be employed in preparing Egyptian wheat bread. Ph.D. Thesis Hungarian Academy of Sciences, BP. Hungary.

Fujisawa, K& Toshino, M. (1995): Changes in the content of propionic acid and glutamic acid contribute to the taste of fermented bread. J. of Japanese Society of Nutrition and Food Science D. Niho. Ejyo Shokury Gakkai – Shif 48 (6) 494 – 497.

Gelinas, P.; Audet, J., Lachance, O. and Vachon, M. (1995): Fermented dairy ingredients for breads: effects on dough rheology and bread characteristics. Cereal Chemistry 72 (2) 151 – 154.

Heaton, K.W. (1980): Food intake regulation and fiber page 223-228 in Meidal Aspects of Dietary Fiber. G.A. Spiller and R.M. Kay, eds. Plenum Medical: New York.

Hunt, J.R., Lykken, G.I., And Mullen, L.K. (1991): Moderate and high amount of protein from casein enhance human absorption of zinc from whole – wheat or whole – rolls. Nurtrition Research 11 (5) 413 – 418.

Huttunen, E.; Noro, K., and Yang, Z. (1995): Purification and Identification of antimicrobial substances by two Lactobacillus casei strains. International Dairy Journal 5 (5) 503 – 513.

Ibrahim, N.A.; Fahmy, A.H. and Afaf, A.A (1990): Production of new reduced caloric bread. 1 – Effect of alpha cellulose on dough rheology and bread properties. International coeffec.

Iwuoha, C.I.; Anyadike, A.C and Eke, O.S. (1997): The effect of flour – blending on the physico- chemical and sensory quality of bread, journal of food science and technology, India 34 (4) 311 – 315.

Khater, R.O. and Helal, A.H.(2002): Laboratory Practical Applied in Bases Nutrition . Faculty of Home Hconomics.El- Menofia Univ.

Khalil, Mona, M.M. (2002): Bio availability of zinc in fiber enriched bread fortified with zinc sulfate. Nahrung / food 46 NO.6, PP 389 – 399.

Kumar, G., and Raccach, M. (1996): The effects temperature and manganese on the natural fermentation of whole wheat flour. Food microbiology 13 (2) 149 – 157.

Ling, E.R. (1963): A text book of dairy chemistry. Chapman and hall ltd London, 3rd Ed. Vol. 11.

Martinez- Anaya, M.A. (1996): Enzymes and bread flavor. "Review" Journal of Agriculture and Food Chemistry, 44(9): 2469 – 2480.

O'Halloran, G.R.; Dwyer,. E. (1997): Wheat flour quality in Pizza base Production Farm & Food 7 (2) 37-41.

Odame – Darkwah, J.K.; and Marshall, D.L. (1993): Interactive behavior of saccharomyces cervesisiae, Bacillus pumilus and propionibacterium fredenreichii subsp – shernanii. International Journal of Food Microbiology. 19(4) 259 – 256.

Recommended Dietary Allowances (1989): National Academy of Sciences.Washington.D.C.prepared by Food and Nutrition Board. National Research Council.

Reiss, J. (1976): Prevention of the mycotoxins in whole wheat bread by citric acid and lactic acid. Experiential, 32,168 – 169.

Sellars,R.L. (1989): Health properties of yoghurt. "In yogurt: Nutritional and health properties". by Chanadan, R.C. Conference. New York, USA. 21-23 May. Milan, Virginia USA: National Yoghurt Association PP.115-144.

Silaula, S.M.; Lorimer, N.L.;Zabik, M.E.and Ueversax,M.A.(1989): Rheological and sensory characteristics of bread flour and whole wheat flour doughs and breads containing dry roasted air-classified pinto and Navy bean, high- Protein fractions. Cereal Chem., 66:486-490.

Srivastava, A.K. and Haridas Rao, P. (1993): Effect of using different sources of milk products on the quality of bread. Journal of Food Science and Technology. India 30(2) 109 – 113.

Staszewska, E. (1994): Prevention of fungal spoilage of bread. "Przegland Pikarski Cukiemiczy 42 (7) 28 – 29.

Stevens, J.;Levitsky, D.A.; Van Soest,P.J.;Ropertson,J.B.; Kalkworf,H.J., and Roe,D.A.(1987):Effect of psyllium gum and wheat bran on spontaneous energy intake. Am.J.Clin.Nutr. 46:812-817.

Swaminathan, M. (1993): Handbook of food and nutrition. Published by the Bangalore printing and publishing co., LTD., No 88, P.B. No. 1807. Mysore Road, Bangalore 560018.

Westover, J.D. (1980): Process for cooking dough products. U.S.A Pat.4, 208, 441.

تحسين جودة البيتزا

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تمثل البيتزا احدى منتجات المخابز واسعة الانتشار فى مصر منذ فترة طويلة ولذا اهتم البحث الحالى بتحسين صفات الجودة لهذا المنتج الهام من ناحية :المظهر العام والتركيب الداخلى وخواص الطعم والمضغ والقيمة الغذائية عند مستويات استبدال ١٠، ٢٠، ٣٠% من دقيق الذرة كبديل عن دقيق القمح المستخدم فى عجينة البيتزا. وكذلك استبدال جميع ماء العجن المستخدم فى العينة الضابطة باللبن الرايب فى المعاملات .

هذا وقد تم اختبار العجائن المخبوزة بالنسبة لفقد الرطوبة أثناء عملية الخبيزوبعد مرور ساعة لزوم عملية التبريد قبل التعبئة وكذلك خلال عملية التخزين على درجة حرارة الغرفة والثلاجة.وقد تم فحص المنتج بصفة يومية فى الحالة الأولى وكل ثلاثة أيام فى الحالة الثانية من التخزين حتى نهاية فترة التخزين مع بدء ظهورعلامات الفساد. تم اختبار المنتج أيضا من ناحية الريع ووقت الخبيز وقطر الرغيف والخواص الحسية وفترة الحفظ .

أوضحت النتائج المتحصل عليها أن هناك انخفاضاً ملموسا فى وقت الخبيز وكذلك فى فقد الرطوبة أثناء عملية الخبيز مع مستويات الاستبدال ١٠ ،٢٠% وكذلك زيادة واضحة فى الريع على مستوى جميع الاستبدالات، أما المعاملة ٢٠% فقد حققت أعلا وأفضل نتائج فى هذه التقديرات. كان هناك أيضا زيادة ملحوظة فى وزن وقطر الرغيف ، وعلى الجانب الأخرفقد انخفضت هذه التقديرات انخفاضا طفيفا عند زيادة نسبة الاستبدال حتى ٣٠% .

من ذلك نرى أنه يمكن استخدام دقيق الذرة فى عجينة البيتزا حتى نسبة ٢٠% دون التأثير على خواص المنتج الحسية وكذلك استبدال ماء العجن باللبن الرايب كأحد المنتجات الثانوية الوفيرة فى صناعة الزبد فى الريف المصرى لتحسين الخواص الحسية والقيمة التغذوية لهذا المنتج الشعبى المحبب والذى تربع على عرش الموائد المصرية فى مختلف المناسبات.