

صناعة الزبادى بأضافة مسحوق البلح منزوع النوى

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الملخص العربي :

- تم فى هذا البحث تصنيع ٥ معاملات من اليبوجورت من اللبن الجاموسى بعد تعديله إلى ٣% دهن والمعاملات هى ، T1 ، T2 ، T3 ، T4 ، T5 وقد أضيف لها مسحوق البلح بنسب صفر ، ١ ، ٢ ، ٣ ، ٤ % من حجم اللبن على التوالى . وقد تم أخذ عينات من كل المعاملات عند الأيام ١ ، ٣ ، ٦ ، ٩ ، ١٢ وذلك لإجراء التحليلات الريولوجية والكيمائية والبكتريولوجية والحسية. ولقد أوضحت النتائج المتحصل عليها بعد تحليلها إحصائياً ما يلى :
- ١- إزادات قيم كلاً من الجوامد الكلية والكربوهيدرات والرماد كلما زادت نسبة إضافة مسحوق البلح ، بينما إنخفضت قيم الدهن والبروتين الكلى مع زيادة نسبة الاضافة.
 - ٢- لم تختلف قيم الدهن والبروتين الكلى معنوياً أثناء عملية التخزين .
 - ٣- زادت الحموضة زيادة معنوية فى المعاملتين المضاف إليهم مسحوق البلح بنسبة ١% و ٢% عن المعاملة الكنترول بينما إنخفضت نسبة الحموضة فى المعاملتين ٣% و ٤%. بينما أدى التقدم فى زمن التخزين أدى إلى زيادة الحموضة زيادة معنوية وقد أخذ ال pH إتجاه معاكس لاتجاه الحموضة.
 - ٤- انخفضت قيم الاسيتالدهيد وانفصال الشرش فى كل المعاملات مع زيادة نسبة إضافة مسحوق البلح حتى عمر ٦ أيام ثم بدأت فى الزيادة مرة أخرى أثناء التخزين ، وكلما زادت نسبة الإضافة زادت نسبة انفصال الشرش بنسب بسيطة .
 - ٥- زادت أعداد بكتريا حامض الاكتيك عن المعاملة الكنترول فى المعاملتين ٢ و ٣ الذين يحتويان على مسحوق البلح بنسبة ١% و ٢% على التوالى بينما إنخفضت عن الكنترول فى المعاملتين ٤ و ٥ (٣% و ٤%) على التوالى.
 - ٦- لم تظهر الخمائر والفطريات الا فى اليوم التاسع من التخزين بينما باقى المعاملات لم تظهر فيها إلا فى اليوم الثانى عشر من التخزين.
 - ٧- لم تزداد قيم التحكيم الحسى مع إضافة مسحوق البلح حتى نسبة إضافة ٢% وكانت مساوية للعينة الكنترول بينما زيادة نسبة الاضافة عن ذلك أدى إلى إنخفاض درجات التحكيم كما فى المعاملتين ٤ و ٥ (٣% و ٤%) على التوالى.

MANUFACTURE OF YOGHURT BY ADDING OF DATE PALM POWDER

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ABSTRACT: Five batches of yoghurt were made to study the influence of adding date palm powder on quality of yoghurt. One of them was made without date palm powder served as control (T_1), while four treatments were made with adding date palm powder at the ratio of 1, 2, 3 and 4% (T_2 , T_3 , T_4 and T_5), respectively. All yoghurt treatments were sampled at 1, 3, 6, 9 and 12 days and analyzed for chemical, rheological, bacteriological properties and sensory evaluation. Adding of date palm powder affect the chemical composition (Total solids (TS), Total protein (TP), Fat (F), ash and Carbohydrate). Total solids, Ash and Carbohydrate contents increased with increasing the rate of adding date palm powder. While, Total protein, fat, acetaldehyde contents and syneresis decreased with increasing the rate of adding date palm powder. pH values showed an opposite trends of those of titratable acidity as affected by adding of date palm powder and storage period. Yoghurt treated by adding date palm powder 1% and 2% (T_2 and T_3), respectively were the most acceptable yoghurt treatments and gained the highest scores of the organoleptic properties.

Key words: Yoghurt, date palm powder, acetaldehyde.

INTRODUCTION

Yoghurt is the most popular fermented milk produced in Egypt and worldwide. Its consumption in Egypt has been increased tremendously. The value of yoghurt in human nutrition is based, not only on the nutritive value of the milk from which it is made and increased digestibility, but also on the beneficial effect of intestinal microflora, prophylactic and healing effects (Rasic and Kurman, 1978; Buttriss, 1997). Many health benefits have been attributed to yoghurt such as improved lactose tolerance, protection against gastrointestinal infections, effective treatment for specific types of diarrhea, relief of constipation, improved immunity and cholesterol reduction concentration (Tvede, 1996 and Buttriss, 1997).

The date palm (Phoenix dactylifera L.) is one of the major fruit trees in Egypt (El-Assar *et al.*, 2005). Its production and consumption is growing continuously due to its therapeutic properties beside its high nutritive value (Karagul *et al.*, 2004). Date fruit consumption is an important source of supplying mineral and vitamin elements in a balanced nutrition regime (Al-Shahib and Marshall, 2003). Research proves that when dates are eaten alone or in mixed meals with plain yogurt have low glycemic indexes (Yousif *et al.*, 1996). The good news is that consumption of dates may also benefit in glycemic and lipid control of diabetic patients

(Miller *et al.*, 2002 and 2003). Lately, several therapeutic virtues are assigned to the date palm and its derivatives. Date fruit has anti-tumor activity (Ishurd and Kennedy, 2005) antioxidant and anti-mutagenic properties (Vayalil, 2002; Mansouri *et al.*, 2005). The fruit has been recommended in folk remedies for the treatment of various infection diseases and cancer (Duke, 1992). Dry date fruit are used in Indian traditional medicine after child birth as immuno stimulants (Puri *et al.*, 2000). Extracts of the dates provided to the woman after child birth stimulate their immune system (Puri *et al.*, 2000). Aqueous date extract was also found to inhibit the lipid peroxidation and protein oxidation in a dose-dependent manner (Al-Laith, 2007). Furthermore, Al-Shahib and Marshall (2003) concluded that, in many ways, dates may be considered as an almost ideal food, providing a wide range of essential nutrients and potential health benefits. On the other hand, a polysaccharide isolated from dates presented an anti tumor activity (Ishurd and Kennedy, 2005). Extracts of the pits date decrease quickly and meaningfully the women's wrinkles (Bauza *et al.*, 2002).

MATERIALS AND METHODS

Materials:

Active *Streptococcus thermophilus* ENCC 1043 and *Lactobacillus delbrueckii* subsp. *bulgaricus* EMCC 1102 were obtained from the Egyptian microbial culture collection (EMCC) at Cairo Microbiological

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Resources Center (Cairo Mircen), Faculty of Agriculture, Ain Shams University. While date palm powder (moisture 5.9 %, protein 2.6%, fat 0.42%, ash 2.6 % and carbohydrate 86.38%) was provided by Teba for food industry, Alexandria Borg el Arab new city part 8 bluke 11, Egypt

Manufacture of yoghurt:

Fresh buffalo's milk, was obtained from Food Technology Research Institute, Agriculture Research Center, Giza, Egypt. Milk was standardized to (3% fat) and heated to 85°C for 15 min with added of date palm powder at the rate of 1, 2, 3 and 4% (T₂, T₃, T₄ and T₅), respectively.while, T₁ made without date palm powder (control), then cooled to 40°C. (2%) Active starter *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* was added and mixed. The inoculated batches were packed in plastic cups and incubated at 42°C for 2 – 3 hr. until complete coagulation. All batches were stored at 6 ± 1°C in refrigerator for 12 days and sampled for analysis after 1, 3, 6, 9 and 12 days. This experiment was triplicated.

Method of analysis:

1. Chemical analysis:

Yoghurt treatments were analyzed for total solids (T.S%) fat (%), total protein (%), ash (%), titratable acidity (%) and pH value according to the methods of A.O.A.C (1995), Carbohydrate content was calculated by difference. The acetaldehyde content was measured according to the method described by Bradly *et al.* (1992).

2. Rheological properties:

Syneresis and firmness which are considered the most important rheological properties of the yoghurt was measured according to the method described by Abd

EL- salam *et al* (1991) and Ahmed (1997) respectively.

3. Microbiological Analysis:-

Table (1). chemical composition of yoghurt fortified with date palm powder.

Properties	Storage	Treatments
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Lactic acid bacteria was counted according to tharmaraj and shah (2003) . Yeasts and molds were counted according to the methods described by APHA (1992) .

4. Sensory evaluation:

Flavor, appearance, body and texture were organoleptically evaluated by well trained ten panelists of the staff members of Dairy Technology Department, Food Technology Research Institute, Agric. Res. Center. Results were recorded in a score sheet described by EL- Etriby *et al.*, (1997).

5. Statistical analysis:

Statistical analysis were carried out by Spssio (SPSS, Chicago, Ill) program for windows. The level of statistical significance was set at $p < 0.05$ as reported by Eid *et al.*, (2007).

RESULTS AND DISCUSSION

Total solids of the obtained yoghurt were significantly affected by the concentration of the date palm powder (Table1). This was in accordance with other researchers, Hashim (2001) who noted that yoghurt containing date paste at 10-20% increased total solids significantly, and Gad *et al.* (2010) who exhibited an increase in total solids in date palm syrup-treat yoghurt. There were no significant ($p \geq 0.05$) differences in total solids in yoghurt without and with date palm powder as the storage period progressed.

Protein content of yoghurt fortified by the addition of date palm powder were significantly ($p \leq 0.05$) decreased being lowest in 4% date palm powder -containing yoghurt (T5) and highest in control yoghurt (T1) (Table1). However, several researchers, showed that addition of date palm syrup (Gad *et al.*, 2010), and date palm paste (10-20%) (Hashim,2001) to yoghurt did not affect protein content. These differences may be due to date palm composition in their studies versus date palm powder in the present study.

	period (days)	T1	T2	T3	T4	T5
T.S%	Zero	14.12 ^{E,a}	15.08 ^{D,a}	15.66 ^{C,a}	16.35 ^{B,a}	16.88 ^{A,a}
	3	14.20 ^{E,a}	15.13 ^{D,a}	15.75 ^{C,a}	16.41 ^{B,a}	16.96 ^{A,a}
	6	14.30 ^{E,a}	15.20 ^{D,a}	15.80 ^{C,a}	16.45 ^{B,a}	17.03 ^{A,a}
	9	14.38 ^{E,a}	15.25 ^{D,a}	15.84 ^{C,a}	16.47 ^{B,a}	17.08 ^{A,a}
	12	14.42 ^{E,a}	15.38 ^{D,a}	15.87 ^{C,a}	16.48 ^{B,a}	17.10 ^{A,a}
Fat%	Zero	3.50 ^{A,a}	3.40 ^{A,a}	3.20 ^{AB,a}	3.10 ^{B,a}	3.00 ^{B,a}
	3	3.50 ^{A,a}	3.40 ^{A,a}	3.20 ^{AB,a}	3.10 ^{B,a}	3.00 ^{B,a}
	6	3.60 ^{A,a}	3.40 ^{A,a}	3.30 ^{B,a}	3.10 ^{C,a}	3.10 ^{C,a}
	9	3.60 ^{A,a}	3.50 ^{A,a}	3.30 ^{B,a}	3.20 ^{B,a}	3.10 ^{BC,a}
	12	3.70 ^{A,a}	3.50 ^{A,a}	3.40 ^{B,a}	3.20 ^{BC,a}	3.10 ^{C,a}
Protein%	Zero	4.70 ^{A,a}	4.56 ^{AB,a}	4.40 ^{B,a}	4.30 ^{BC,a}	4.21 ^{C,a}
	3	4.78 ^{A,a}	4.60 ^{AB,a}	4.45 ^{AB,a}	4.33 ^{BC,a}	4.29 ^{C,a}
	6	4.82 ^{A,a}	4.66 ^{AB,a}	4.49 ^{B,a}	4.37 ^{C,a}	4.33 ^{C,a}
	9	4.89 ^{A,a}	4.70 ^{B,a}	4.54 ^{BC,a}	4.40 ^{C,a}	4.36 ^{C,a}
	12	4.95 ^{A,a}	4.85 ^{B,a}	4.59 ^{BC,a}	4.42 ^{C,a}	4.38 ^{C,a}
Carbohydrate%	Zero	5.10 ^{E,a}	6.24 ^{D,a}	7.15 ^{C,a}	7.98 ^{B,a}	8.62 ^{A,a}
	3	5.09 ^{E,a}	6.21 ^{D,a}	7.11 ^{C,a}	7.92 ^{B,a}	8.56 ^{A,b}
	6	5.03 ^{E,b}	6.16 ^{D,a}	6.97 ^{C,b}	7.88 ^{B,b}	8.44 ^{A,b}
	9	5.00 ^{E,b}	6.06 ^{D,b}	6.93 ^{C,b}	7.75 ^{B,c}	8.41 ^{A,b}
	12	4.87 ^{E,c}	6.01 ^{D,c}	6.79 ^{C,c}	7.71 ^{B,c}	8.38 ^{A,c}
Ash%	Zero	0.82 ^{D,ab}	0.88 ^{C,b}	0.91 ^{C,c}	0.97 ^{B,c}	1.05 ^{A,c}
	3	0.83 ^{E,ab}	0.92 ^{D,b}	0.99 ^{C,b}	1.06 ^{B,b}	1.11 ^{A,b}
	6	0.85 ^{E,a}	0.98 ^{D,a}	1.04 ^{C,a}	1.10 ^{B,a}	1.16 ^{A,ab}
	9	0.89 ^{E,a}	0.99 ^{D,a}	1.07 ^{C,a}	1.12 ^{B,a}	1.21 ^{A,a}
	12	0.90 ^{E,a}	1.02 ^{D,a}	1.09 ^{C,a}	1.15 ^{B,a}	1.24 ^{A,a}

Different capital letters in the same row means the treatments are significantly different from each other, while the small letters in the same column means the storage periods are significantly different from each other.

T1 : Control. T2 : 1% date palm powder -containing yoghurt .

T3 : 2% date palm powder -containing yoghurt .

T4 : 3% date palm powder -containing yoghurt .

T5 : 4% date palm powder -containing yoghurt .

Balk addition of date palm powder to yoghurt and storage period did not significantly ($p \geq 0.05$) affect fat content of control and date palm powder -containing yoghurt, (Table1). These results are in agreement with these reported by Hashim (2001) who stated that the addition of 10-20% date palm past to yoghurt did not affect fat content.

(Table 1) presents the effect of adding date palm powder on the carbohydrate content of yoghurt. Addition of date palm powder to yoghurt increased significantly ($p \leq 0.05$) as the date palm powder level increased. The initial content of carbohydrate on day zero was 5.1% in control (T1) and 8.62% in 4% date palm powder yoghurt (T5) . On the 12th day,

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maximum carbohydrate was retained in experimental yoghurt containing 4% date palm powder was 8.3 %, whereas, minimum was recorded in control (4.87%). These results are comparable to those obtained by Gad *et al*, (2010), who observed that addition of date palm syrup increased total carbohydrate of yoghurt.

Ash content of yoghurt made with or without date palm powder is presented in (Table 1). It is evident that supplementation of yoghurt with date palm powder significantly affect the ash content , while storage period did not significantly affected. Progressive increase in ash content was observed in all samples during storage. These results were in accordance with Gad *et al*. (2010), who noted that addition of 10% date palm syrup to yoghurt positively influenced HCL- soluble minerals compared with the plain yoghurt.

Table (2) presents the changes in pH and titratable acidity in yoghurt as affected by adding date palm powder. Change in pH value of all yoghurt samples significantly ($p \leq$

0.05) as the concentration of date palm powder increased being highest in 4% date palm powder -containing yoghurt (pH 5.25) (T5) and lowest in (T3) 2% date palm powder -containing yoghurt (pH 5.01) at zero time. These results were in contrast with those reported in date palm syrup – containing yoghurt Gad *et al*, (2010) who noted unchange in pH value of the resultant yoghurt. Also, Hashim *et al*, (2009) noted an increase in pH of date palm fiber-containing yoghurt.

Titratable acidity is presented in (Table 2) and significantly ($p \leq 0.05$) affected by the addition of date palm powder. Initial titratable acidity where in the following order $T3 > T2 > T1 > T4 > T5$. As the storage period progressed, Titratable acidity increased significantly ($p \leq 0.05$) being highest in T1 (1.04%) and lowest in T5 (0.90%) on the 12th day of storage. However, addition of 10-20% date palm syrup to yoghurt did not affect acidity (titratable acidity).

Table (2): pH, acidity and acyaldhyde of yoghurt fortified with date palm powder.

Properties	Storage period (days)	Treatments*				
		T1	T2	T3	T4	T5
pH value	Zero	5.15 ^{C,a}	5.08 ^{D,a}	5.01 ^{E,a}	5.12 ^{B,a}	5.25 ^{A,a}
	3	5.00 ^{C,b}	4.92 ^{D,b}	4.80 ^{E,b}	5.10 ^{B,b}	5.16 ^{A,b}
	6	4.70 ^{C,c}	4.68 ^{D,c}	4.62 ^{E,c}	4.89 ^{B,c}	5.02 ^{A,c}
	9	4.61 ^{C,d}	4.53 ^{D,c}	4.50 ^{E,d}	4.73 ^{B,d}	4.81 ^{A,d}
	12	4.55 ^{C,e}	4.46 ^{D,e}	4.40 ^{E,e}	4.60 ^{B,e}	4.66 ^{A,e}
Titratable Acidity (%)	Zero	0.78 ^{C,e}	0.86 ^{B,e}	0.90 ^{A,e}	0.77 ^{C,e}	0.73 ^{D,e}
	3	0.82 ^{C,d}	0.91 ^{B,d}	0.99 ^{A,d}	0.80 ^{C,d}	0.76 ^{D,d}
	6	0.90 ^{C,c}	0.98 ^{B,c}	1.12 ^{A,c}	0.88 ^{C,c}	0.82 ^{D,c}
	9	1.02 ^{C,b}	1.10 ^{B,b}	1.16 ^{A,b}	0.95 ^{D,b}	0.87 ^{E,b}
	12	1.04 ^{C,a}	1.12 ^{B,a}	1.18 ^{A,a}	0.99 ^{D,a}	0.90 ^{E,a}
Acyaldhyde (ppm)	Zero	37.2 ^{A,b}	35.6 ^{B,c}	33.8 ^{C,c}	32.4 ^{D,c}	31.2 ^{E,c}
	3	39.8 ^{A,a}	36.9 ^{B,b}	34.9 ^{C,b}	33.8 ^{D,b}	32.9 ^{E,b}
	6	40.2 ^{A,a}	38.1 ^{B,a}	36.3 ^{C,a}	35.7 ^{D,a}	34.0 ^{E,a}
	9	36.7 ^{A,b}	33.5 ^{B,d}	31.8 ^{C,d}	30.3 ^{D,d}	29.2 ^{E,d}
	9	33.3 ^{A,c}	31.3 ^{B,e}	29.6 ^{C,e}	28.2 ^{D,e}	28.0 ^{E,e}

*see table (1)

Table (2) shows the affect of fortification of yoghurt with date palm powder on

acetaldehyde content. Results observed indicate significant differences among yoghurt treatments in acetaldehyde content. All samples exhibited gradual increase in acetaldehyde till the 6th day , then declined Thereafter. In general, the levels of acetaldehyde of all treatments including control. At the end of storage period, the acetaldehyde content was decreased in all yoghurt treatments, this decrease may be attributed to decrease in carbonic compounds in yoghurt by the end of the storage period (Tamime and Robinson, 1997). Acetaldehyde content on the 12th day was maximum in control (33.3 ml/100g) and minimum in sample with 4% date palm powder (T5) (28 ml/100g).

Table (3) represents the effect of date palm powder on the penetration and wheying off of yoghurt during storage. Both supplementation of date palm powder and storage period of yoghurt are significantly ($p \leq 0.05$) affect penetration and wheying off . Initial penetration value of 2% date palm powder -treated yoghurt (T3) was minimal (20.7 mm) while 4% date palm powder -treated yoghurt (T5) was maximal (25.8mm). As the storage period advanced, penetration values for the corresponding samples were

23.9 mm and 29.3 mm , respectively . Agraduel decrease in wheying off in yoghurt samples with or without date palm powder. For control samples, wheying off decreased from 34- 30 (ml/100g) on the 12th day. Wheying off in samples with 1, 2, 3 and 4 % date palm powder showed a prominent decrease on 12th day being 23 , 15 , 14 and 12 (ml/100g), respectively.

It is noted that initial count of lactic acid bacteria decreased as the date palm powder content of yoghurt increased being 70 and 54 ($cfu \times 10^6 / ml$) in control and 4% date palm powder containing yoghurt, respectively, (Table 4). Progression decrease in lactic acid bacteria count was observed in all yoghurt samples during storage. At 12th day , counts were 68 , 85 , 107 , 60 and 45 ($cfu \times 10^6 / ml$), for T1, T2, T3, T4 and T5, respectively. The loss of viability of lactic acid bacteria encountered during storage could be attributed to the antagonistic effect of anti-bacterial substances in date palm powder such as phenolic compounds , which posses inhibitory effect against gram positive and gram negative bacteria (Regnault-Roger *et al.* 1987).

Table (3): Penetration and Wheying off values of yoghurt fortified with date palm powder.

Properties	Storage period (days)	Treatments*				
		T1	T2	T3	T4	T5
Penetration (mm)	Zero	22.9 ^{C,e}	21.6 ^{D,e}	20.7 ^{E,e}	24.2 ^{B,e}	25.8 ^{A,e}
	3	23.6 ^{C,d}	22.4 ^{D,d}	21.3 ^{E,d}	25.0 ^{B,d}	26.9 ^{A,d}
	6	24.4 ^{C,c}	23.3 ^{D,c}	22.0 ^{E,c}	25.9 ^{B,c}	27.5 ^{A,c}
	9	25.2 ^{C,b}	24.1 ^{D,b}	22.8 ^{E,b}	26.5 ^{B,b}	28.4 ^{A,b}
	12	26.0 ^{C,a}	24.8 ^{D,a}	23.9 ^{E,a}	27.2 ^{B,a}	29.3 ^{A,a}
Wheying off (ml/50g)	Zero	34 ^{A,a}	26 ^{B,a}	19 ^{C,a}	17 ^{D,a}	15 ^{E,a}
	3	33 ^{A,b}	25 ^{B,b}	18 ^{C,b}	16 ^{D,b}	14 ^{E,b}
	6	31 ^{A,c}	24 ^{B,c}	17 ^{C,c}	16 ^{D,b}	13 ^{E,c}
	9	30 ^{A,d}	24 ^{B,c}	16 ^{C,d}	15 ^{D,c}	13 ^{E,c}
	12	30 ^{A,e}	23 ^{B,d}	15 ^{C,e}	14 ^{D,c}	12 ^{E,d}

*see table (1)

Table (4). Counts of lactic acid bacterial and yeast and mould of yoghurt fortified with date

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palm powder.

Properties	Storage period (days)	Treatments*				
		T1	T2	T3	T4	T5
Lactic acid Bacteria (CFU×10 ⁶ /ml)	Zero	70	95	110	65	54
	3	140	170	196	130	115
	6	190	210	240	182	168
	9	166	180	200	150	120
	12	68	85	107	60	45
Yeast & mould (CFU×10 ² /ml)	Zero	ND	ND	ND	ND	ND
	3	ND	ND	ND	ND	ND
	6	ND	ND	ND	ND	ND
	9	50	ND	ND	ND	ND
	12	110	40	30	20	15

*see table (1)

ND: Not detected

Table (4) exhibits yeast and mould counts of yoghurt treated with and without date palm powder. Yeast and mould count did not detected in all yoghurt samples till the 6th day of storage, (T1). Countable yeast and mould count was detected on the 9th day of storage. On the 12th day of storage, all yoghurt samples showed countable yeast and mould numbers being highest in control (T1) (110 ×10²cfu/ml) and lowest in 4% date palm powder containing yoghurt (T5) (15 ×10²cfu/ml). Detectable counts of yeast and mould could be due to post-process contamination and / or poor hygienic precautions.

Organoleptic evaluation of yoghurt

fortified with and without date palm powder is presented in (Table 5). Results revealed that initial total score for yoghurt with and without date palm powder gained the highest score and this was noticed in 2% date palm powder -containing yoghurt. All experimental yoghurt showed declined in quality attributes score as the storage period progressed. The over all preference was gained by 2% date palm powder -treated yoghurt followed by 1% date palm powder and then control yoghurt. Hashim *et al*, (2009) stated that sensory grades of yoghurt fortified with date fibers decreased significantly as the level of date fiber increased to 4.5%.

Table (5). Organoleptic properties of yoghurt fortified with date palm powder.

Properties	Storage period (days)	Treatments*				
		T1	T2	T3	T4	T5
Flavor (45)	ZERO	40 ^{B,a}	41 ^{AB,a}	42 ^{A,a}	38 ^{C,a}	36 ^{D,a}
Body & Texture (45)		40 ^{AB,a}	41 ^{A,a}	41 ^{A,a}	39 ^{B,a}	38 ^{B,a}
Appearance (10)		9 ^{A,a}	8 ^{B,a}	8 ^{B,a}	7 ^{C,a}	6 ^{D,a}
Total (100)		89 ^{A,a}	90 ^{A,a}	91 ^{A,a}	84 ^{B,a}	80 ^{C,a}
Flavor (45)	3	40 ^{AB,a}	41 ^{A,a}	42 ^{A,a}	38 ^{B,a}	35 ^{C,ab}
Body & Texture (45)		40 ^{A,a}	40 ^{A,a}	41 ^{A,a}	39 ^{AB,a}	37 ^{B,ab}
Appearance (10)		9 ^{A,a}	8 ^{B,a}	8 ^{B,a}	7 ^{C,a}	6 ^{D,a}
Total (100)		89 ^{A,a}	89 ^{A,a}	91 ^{A,a}	84 ^{B,a}	78 ^{C,b}
Flavor (45)	6	39 ^{A,b}	40 ^{A,b}	41 ^{A,b}	37 ^{B,ab}	34 ^{C,b}
Body & Texture (45)		39 ^{AB,ab}	40 ^{A,a}	40 ^{A,ab}	38 ^{B,ab}	36 ^{C,b}
Appearance (10)		9 ^{A,b}	8 ^{B,a}	8 ^{B,a}	7 ^{C,a}	6 ^{D,a}
Total (100)		87 ^{A,b}	88 ^{A,b}	89 ^{A,b}	82 ^{B,b}	76 ^{C,c}
Flavor (45)	9	38 ^{A,c}	39 ^{A,c}	40 ^{A,bc}	36 ^{B,b}	34 ^{C,b}
Body & Texture (45)		39 ^{A,b}	39 ^{A,ab}	39 ^{A,b}	37 ^{B,b}	35 ^{C,b}
Appearance (10)		8 ^{A,b}	8 ^{A,a}	7 ^{B,b}	6 ^{C,b}	5 ^{D,b}
Total (100)		85 ^{A,c}	86 ^{A,c}	86 ^{A,c}	79 ^{B,c}	74 ^{C,d}
Flavor (45)	12	36 ^{B,d}	37 ^{B,d}	39 ^{A,c}	35 ^{BC,c}	33 ^{C,c}
Body & Texture (45)		38 ^{A,b}	39 ^{A,ab}	39 ^{A,b}	36 ^{B,b}	32 ^{C,c}
Appearance (10)		8 ^{A,b}	8 ^{A,a}	7 ^{B,b}	6 ^{C,b}	5 ^{D,b}
Total (100)		82 ^{B,d}	84 ^{A,d}	85 ^{A,d}	77 ^{C,d}	70 ^{D,e}

*see table (1)

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صناعة الزيادى بأضافة مسحوق البلح منزوع النوى

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الملخص العربي :

تم فى هذا البحث تصنيع ٥ معاملات من البيوجورت من اللبن الجاموسى بعد تعديله إلى ٣% دهن والمعاملات هى ، T1 ، T2 ، T3 ، T4 ، T5 وقد أضيف لها مسحوق البلح بنسب صفر ، ١ ، ٢ ، ٣ ، ٤ % من حجم اللبن على التوالى . وقد تم أخذ عينات من كل المعاملات عند الأيام ١ ، ٣ ، ٦ ، ٩ ، ١٢ وذلك لإجراء التحليلات الريولوجية والكيمائية والبكتريولوجية والحسية. ولقد أوضحت النتائج المتحصل عليها بعد تحليلها إحصائياً ما يلى :

٨- إزادات قيم كلاً من الجوامد الكلية والكربوهيدرات والرماد كلما زادت نسبة إضافة مسحوق البلح ، بينما إنخفضت قيم الدهن والبروتين الكلى مع زيادة نسبة الإضافة.

٩- لم تختلف قيم الدهن والرماد والبروتين الكلى معنوياً أثناء عملية التخزين .

١٠-زادت الحموضة زيادة معنوية فى المعاملتين المضاف إليهم مسحوق البلح بنسبة ١% و ٢% عن المعاملة الكنترول بينما إنخفضت نسبة الحموضة فى المعاملتين ٣% و ٤%. بينما أدى التقدم فى زمن التخزين أدى إلى زيادة الحموضة زيادة معنوية وقد أخذ الـ pH إتجاه معاكس لاتجاه الحموضة.

١١-انخفضت قيم الاسيتالدهيد وانفصال الشرش فى كل المعاملات مع زيادة نسبة إضافة مسحوق البلح حتى عمر ٦ أيام ثم بدأت فى الزيادة مرة أخرى أثناء التخزين ، وكلما زادت نسبة الإضافة زادت نسبة انفصال الشرش بنسب بسيطة .

١٢-زادت أعداد بكتريا حامض الاكتيك عن المعاملة الكنترول فى المعاملتين ٢ و ٣ الذين يحتويان على مسحوق البلح بنسبة ١% و ٢% على التوالى بينما إنخفضت عن الكنترول فى المعاملتين ٤ و ٥ (٣% و ٤%) على التوالى.

١٣-لم تظهر الخمائر والفطريات الا فى اليوم التاسع من التخزين بينما باقى المعاملات لم تظهر فيها إلا فى اليوم الثانى عشر من التخزين.

١٤-لم تزداد قيم التحكيم الحسى مع إضافة مسحوق البلح حتى نسبة إضافة ٢% وكانت مساوية للعينة الكنترول بينما زيادة نسبة الإضافة عن ذلك أدى إلى إنخفاض درجات التحكيم كما فى المعاملتين ٤ و ٥ (٣% و ٤%) على التوالى.

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