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Effect of Supplementation of Yoghurt with Syrup of Date Palm Pomace on Quality Properties Products

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Abstract
Dates are a popular fruit among the population of Middle Eastern countries, providing a staple food for millions of people around the world. The by-products arising from date processing can be used for different purposes, due to its contents of polyphenols, antioxidants, fibers and minerals. Date palm pomace powder with 2, 4, 6% concentration were used in processing of yogurt. The possible beneficial effects of date palm pomace powder on the rheological, sensory, microbial quality of yogurt-based products were determined. Comparisons were made between the sample yogurts made from different concentration of supplemented date palm pomace yogurt, and controls. The incorporation of date palm pomace reduced product syneresis and improved the texture and sensory characteristics of the supplemented yogurts so that their quality characteristics were similar or more acceptable by the panalists than control yogurt. Pomace of the date palm at low level (2 and 4%) were effective in improving whey retention of the yogurt and its sensory qualities. While, high level (6%) of date palm powder was exert significant improvements of textural characteristics of yogurt but, the color and harchy taste which were un-acceptable by panelists. In addition of that, the microbial contents were diminished and very low in some of these products. So that we could be successfully utilized that by-product of date palm to produce enriched different products, one of them dairy product which is high in dietary fiber, mineras and many antioxidants to modulate the harmful of dairy product.
Keywords:Date palm pomace-yogurt supplemented food- sensory properties-physico-chemical analysis-microbial contents

Introduction

The date palm (Phoenix dactylifera L.) is one of the most cultivated palms in Afro-Asiatic dry-band. Dates are almost a popular fruit among the population of Arab countries, providing a staple food for millions of people around the world. Dates are rich in certain nutrients and provide a good source of rapid energy due to their high carbohydrate content, especially fructose and glucose which are easily absorbed by human body (Al-Farsi, et al. 2007). Dates are a good of dietary fiber ranging from 4.4-11.4% (Al-Shahib and Marshall, 2002), and enclose less proteins and fats (Al-Farsi and Lee, 2008). Date fiber a by-product remaining after date syrup processing contains 51.57% total dietary fiber (Hashim, 2009). Inclusion of both date fruit and its by-products (its syrup and pomace) in food will increase the content of antioxidants and thus probably prevent oxidative deterioration of food. Furthermore, they concluded that date palm fruit can be used to produce novel natural antioxidants as well as flavoring agent that can be used in various food products (Faqir, et al. 2012).

Epidemiological studies have consistently shown that date fiber could be dietetic and have and reduced risk of chronic diseases such as coronary heart, and cardiovascular disease, cancer, aging, atherosclerosis, and inflammation, among others (Dillard and German, 2000; Prior and Cao, 2000; Wargovish, 2000). Therefore, plant fiber and protein products play significant roles as ingredient food systems for human health. This is attributed to the fact that dietary fiber may provide an excellent mixture of phytochemicals such as phenolic, carotenoids, natural antioxidants and other bioactive compounds

Yoghurt is an important healthier dairy product, especially for consumers who have lactose tolerance. Yoghurt is produced by fermentation of milk with bacterial cultures consisting of a mixture of Streptococcus subsp. thermophiles and Lactobacillus delbrueckii subsp. bulgaricus (Lee and Lucey, 2010). Milk and dairy products do not contain fiber. Fiber of different sources is added to dairy products to increase the water-holding capacity, reduce fat retention, enhance textural characteristic and structure (Lario, et al. 2004). Fortifying of 1.5-4.5% of date fiber improved the flavor, viscosity and texture of yoghurt and decrease the color quality (Hashim, et al. 2009). Dietary fibers in yoghurt have been used for increasing the viscosity of the yoghurt as a stabilizer, decrasing syneresis, improving textural properties and an effective tool for reducing calorie and fat (Nilufer and Boyacioglu 2003).

The objective of this study to determine the amount of dried date palm pomace that could be supplemented into yoghurt without affecting sensory quality and acceptability. The effect of date palm fiber supplementation on fresh yoghurt quality was estimated based on measured of acidity, pH, viscosity, sensory evaluation, and consumer acceptance.

Material and Methods

An Iraqi (Shorcy), dried date palm fruit was obtained from local shops in Baghdad city. All dates were stored in a refrigerator at approximately 5°C before analysis. Mature dates of uniform size, free of physical damage and

injury from insects and fungal infection. Were selected and used for the experiment.

Preparation of date palm by-products (pomace powder):

Dried date fruits (5kg) were grinded with mechanical set (to increase surface area), infused in 10 liters of hot water then stirred for 2hrs and allowed to stand in cold place overnight to fully extract. Then boiled until softened, then date palm syrup was extracted by squeezing the mixture through cheese cloths. The date by-product (pomace) was collected and put it in the drying washer to remove most of the water from it. Then the seeds removed easily, the pomace was dried by the room fan, and then milled by coffee miller to fine flour 5mm. The date palm flour dried in laboratory Oven to 5-8% moisture, then cooled and kept into sealable glass jar and kept in refrigerator.

Proximate analysis

Percentages of moisture by vacuum oven (method 934.06), protein by kjeldahl nitrogen (method 9200152). And ash direct analysis (method 940.26) were determined according to the Association of Official Analytical Chemists methods (AOAC. 1995). The percentage of crude protein was estimated by multiplying the total nitrogen content by a factor of 6.25 (AOAC, 2000). Soxlet method was used to determine the fat content. Total carbohydrates were calculated by subtracting the total percent values of other measurements from 100. Proximate analyses were expressed as grams per 100g of fresh weight.

Yoghurt manufacture

The total solid content of milk was standardized to about 14% by adding 30 g/L skimmed milk powder, and then the mixture was blended with laboratory blender until all ingredients were dissolved in the milk. The prepared dried date palm pomace DPP flour were weight (2, 4, and 6% of DPP flour, then placed in yoghurt plastic cups, then placed in electrical oven at 80°C/10 minutes, cooled to 44°C. The above Skimmed milk (30% low fat) also, was heated at 85°C for 15 min, cooled rapidly to 45°C to kill pathogens and then mixed with starter culture was a 1:1 mixture of Str. Thermophiles and L. bulgaricus. Inoculated milk was incubated at 42± 0.5°C then mixing with c different concentration of DPP flour for about 2-3 hours, until PH decreased to 4.7. Following the incubation, all samples were placed immediately in a cooler and stored at 4 ± 1°C for 1and 10d days before testing. Control yoghurt without any addition also prepared. Preliminary studies indicated that yoghurt containing a high level of (8, 10 DPP flour had unacceptable sweetly flavor and brown color, so we used the 2, 4, and 6% concentration only. Three replicates of set yoghurt were produced.

Physico- Chemical analysis of raw milk

PH determination: PH was measured according to (Ling,E. 2008) by immersing the sensor of digital PH meter in yoghurt and milk.

Titratable acidity, expressed as percentage of lactic acid, was determined by mixing 10g of yoghurt with 20 ml of distilled water and titrating with 0.1 N NaOH using phenolphthalein as an indicator to an end-point of faint pink color. The measurements were done in duplicate. The acidity was calculated by following equation:

$$\% \text{ Acidity (as lactic acid)} = \frac{\text{Ml of NaOH (0.1N)} \times 0.9}{\text{Volume of sample (ml)}}$$

Total soluble solid (TSS) of prepared supplemented with date palm pomac flour yoghurt (Brix°) determination:

Total soluble solid in the raw milk and in the supplemented yoghurt with dried date palm pomace (DPP) were measured using an Abbe Mark II digital refractometer (Leica Inc., Buffalo, NY) by placing 0.5 g syrup on the lens and reading the sample fpr temperature corrected Brix.

Viscosity determination:

Rheological properties of the supplemented yoghurt sample after 1 and 9days storage at 4°C were determined in duplicate, by measuring the viscosity of yoghurt according to Ostwald method by using Ostwald viscometer (A.O.A.C, 2000). The measurement were carried out by using 50gm of sample which previously prepared by gently stirring at normal condition. The viscosity was calculated by following equation:

$$\frac{\text{Viscosity of known liquid}}{\text{Viscosity of unknown liquid}} = \frac{\text{Density of known liquid} \times \text{time of its dropped}}{\text{Density of unknown liquid} \times \text{time of its dropped}}$$

Yoghurt syneresis

Yoghurt samples (30g) were centrifuged at 222g for 10min. at 4°C. After centrifugation, the supernatant was poured off, weighed and recrded as percentage of syneresis (Keogh and Okennedy, 1998).

Determination of minerals concentration in yoghurt samples and in dried date palm pomace flour:

Minerals of HCL-Soluble minerals (K, Ca, Mg, P, Fe, and Zn) content of the supplemented yoghurt samples and dried date palm pomace flour were determined by atomic absorption spectrophotometer (Varian spectra AA 220) (Tamimea, et al. 1999).

Sensory Evaluation

Supplemented yoghurt with DPP were subjected to organoleptic evaluation by 15 panelists of Stuff member of

Dairy Products general Company, Abu-ghraib/ Baghdad/Iraq was carried out according to scheme of (Salem, et al 2013), or according to Iraqi yoghurt Standard (2006). Yoghurt samples were presented in white clear plastic pups under fluorescent light. All samples were marked with three – digit codes, and the order of presentation of samples was randomized for each panelists. The panelists rated the that flavor (45 point), consistency with spoon (35 point), acidity (10 point), and appearance (10 points) when fresh and after storage for 7, 14,21 days at 5±1 °C.

Microbial tests:

Supplemented yoghurt with DPP were examined for total viable count, total coliform count, total yeast and mold count. For total viable count of bacteria, colony count method was used according to Laboratory Methods in Dairy Products Company (IQS, 11987). The total number of viable bacteria per gram of yoghurt was obtained by multiplying the number of colony forming units (CFU) on the plate with respective dilution factor and then was converted into logarithmic form. Total coliform ($MPNg^{-1}$)

Yeast and mold were determined according to the Standard Methods for Examination of Dairy Products By Iraqi Standard (IQS).

Statistical analysis

The results of researchers were estimated by using Completely Random Design and GIM Procedure of SAS Statistic Analysis Program (SAS, 2012). LSD test were used between the mean values of treatments comparison and the control. Analysis are the averages of production which had five replications and made as parallel. Only results of dietary fibrous yoghurts were evaluated in this study.

Result and Discussion

Table 1 shows the physic-chemical content of raw milk which is used in yogurt processing, all data is the average of triplicated samples.

Table 1: The physico- chemical composition of raw whole milk which is used in yoghurt processing.

Determents	
%Moisture	87
Ash%	0.66
Fat%	2.93
Protein%	2.92
TS%	10.5
Solid not fat%	7.6
Freezing point	-0.736
Relative density	1.034
PH	6.5

Table 2 shows the physic-chemical content of date palm pomace powder which is used in supplemented yogurt processing, all data is the average of triplicated samples. It was found that date palm pomace is highly content in ash, protein and carbohydrate, also its content was very high in Fe, Mn, Mg, and Cu that are 2359, 770, 117 and 109 ppm respectively. The content of heavy metal cd and Co were low and within the range of safe levels which were 1 and 16ppm respectively, while, lead Pb content was lightly higher 77ppm, this may be due to using lead cooper pot during the date syrup processing. So that, high concentration of minerals detected in the present study confirmed the role supplemented yogurt with date palm pomace as an excellent source of essential nutrients in comparison with plain yogurt.

Table 2: The chemical composition of dried date palm pomace flour which is supplemented in yoghurt processing.

Determents	Concentration
%Moisture	5.75
Ash%	2.50
Fat%	0.85
Protein%	4.25
Carbohydrates	86.65
Fe (ppm)	2359.0
Mg (ppm)	117.0
Mn (ppm)	770.0
Cu (ppm)	109.0
Cd (ppm)	1.0
Pb (ppm)	77.0
Co (ppm)	16.0

Table 4 shows the Fat%, T.S%, PH, Acidity%, Viscosity, and Syneresis values of fresh yogurt supplemented with different concentration of date palm pomace. Yogurt supplemented with DPP powder had no significant ($p>0.05$) differences of fat% with all concentration of DP supplementation. Similar results were found with T.S% and PH before and after the storage time of yogurt supplementation with DPP powder concentration. Increasing the DPP concentration had no effect on yogurt T.S and PH. PH values decreased gradually as the storage period. However, the slow development of acidity, despite addition of sufficient amount of active yogurt culture may be attributed to the presence of antibacterial factors in date palm pomace powder that inhibited the activity of yogurt culture. But there were significant ($p<0.05$) differences in the acidity of the yogurt. Titratable acidity ranged from 88 to 98% as percentage of lactic acid. It was indicated that lactose content was responsible for the coagulum formation and the reduction in PH as a result of the production of lactic acid (Hashim et al. 2009). Acidity of yogurt increased gradually as the storage period longed with a very slow rate. This study confirm that as shown in table 4, there were no significant ($p>0.05$) differences in acidity with increasing the concentration of DPP addition. An opposite trend was founded that viscosity values increased by increasing the concentration of DPP addition compared with control group. These results are in agreement with those obtained by (Hashim, et al. 2009, Cristina, 2013), who concluded that increasing the viscosity may be related to date fiber absorbing more moisture due to its higher water-holding capacity.

Whey separation (syneresis) is defined as the expulsion of whey from the network of yogurt coagulation which then becomes visible as surface whey. In other way, spontaneous syneresis, which is contraction of gel without the application of any external force, is the usual cause of whey separation. The drainage method is useful in products that have whey separation step through screen. In this case, surface whey which expelled from yogurt structure is gently poured off and quantified. Yogurt processor use stabilizers, such as pectin, gelatin, and starch to stop syneresis. Another way is to increase the total solids content of yogurt milk, especially the protein and fiber content to decrease syneresis. Syneresis values decreased significantly ($p<0.05$) by increasing the concentration of DPP addition compared with control. It can be seen that control yogurt has presented a higher index of syneresis than other treatment. These results are in agreement with those founded by (Charles and Carmen, 2008) who reported that the inclusion of the carbohydrate components reduced product syneresis and improved the texture and rheological properties of the supplemented yogurt.

Table 3: The average (2trial) treatments of %Fat, %T.S, PH, %Acidity, viscosity and syneresis of the supplemented yoghurt with different concentration of dried date palm flour which stored at 4°C after 1, 10 day from processing.

Treatment	Fat%	% T.S. after 1d	10d	PH after 1d	10d	Acidity % after 10d	1d	Viscosity	Syneresis
2 % DPY	3.1	14.5	14.6	4.6	4.5	98 a	100	225.7 b	52.4 ab
4 % DPY	3.2	14.6	14.7	4.6	4.5	95 a	99	397.9 a	47.5 b
6 % DPY	3.5	14.7	14.8	4.8	4.6	88 b	100	409.9 a	45.9 b
Control	3.0	14.1	14.1	4.4	4.3	100 a	103	205.7 b	58.4 a
LSD value	0.46 NS	1.39 NS	1.44 NS	0.78 NS	0.43 NS	9.17 *	8.06 NS	94.27 *	7.331 *

*** (P<0.05).**

The high concentrations of minerals were detected in the present study as increased the concentration of the supplemented date palm pomace yogurt samples, that confirmed the role of yogurt as source of essential nutrients in comparison with raw milk. Instead of that, yogurt could represent an excellent alternative to milk for lactose intolerant population. Also, date palm pomace powder rich of abundant of many essential minerals especially with iron, manganese, magnesium and copper that give many nutritional values to the yogurt and the milk which deficient with iron content compared with other food. These results are in agreement with previous studies (Miguel, et al. 2003). Also (Gad, et al. 2010) concluded that yogurt enriched with date palm extract provides more content of HCL-soluble mineral that we need to stay healthy human.

Table 4: Hcl- soluble minerals content (K, Ca, P, Mg, Fe, and Zn) (ppm) in yoghurt product.

Yoghurt	K	Ca	P	Mg	Fe	Zn
2%DPPY	1950	1250	1250 a	195 ab	6.5 b	4.6 c
4%DPPY	2001	1310	1255 a	200 ab	7.6 ab	8.2 ab
6%DPPY	2020	1350	1310 a	250 a	9.2 a	8.9 a
Control	1877	1200	1020 b	161 b	3.1 c	6.0 bc
LSD value	239.84 NS	141.94 NS	138.07 *	86.32 *	2.75 *	2.91 *

***(P<0.05).**

Sensory assessment

Color plays an important role in food choice of consumers especially by kids and children. Results showed no

significant (p>0.o5) differences in color with all the concentration of date palm pomace supplementation as shown in table 5. In contrast of that, there were significant (p<0.o5) differences with high concentration of date palm powder 6% which affected the flavor highly. While, with 2% and 4% there were no significant (p>0.o5) differences compared with control group. These finding is agreed with (Faqir, et al. 2012) who concluded that date palm fruit have good flavoring agents that can be used in various food products. Texture, consistency and the appearance were highly comparable to the control group with 2% and 4%. Total score was highly significant (p<0.o5) with the concentration 2% of date palm powder addition, then the 4% also significant.

Table 5: The average (2trial) treatments of sensory evaluation for supplemented yoghurt with different concentration of dried date palm flour which stored at 5°C after 1 day from processing.

Treatments	Flavor 45	Texture & consistency35	Color 10	Appearance10	Total 100
2 % DPY	44 a	35 a	10	10	99 a
4 % DPY	44 a	34 ab	8	9	85 b
6 % DPY	37 b	30 b	9	8	83 b
Control	44 a	32 ab	9	9	94 ab
LSD value	5.06 *	3.82 *	2.75 NS	2.69 NS	11.72 *

*** (P<0.05).**

The storage time affected (P<0.05) flavor score significantly of supplemented date palm powder yogurt treatment. Dietary fiber of the date palm pomace affected (P<0.05) texture score of the treatment as shown in table 6. But the color and appearance had no significant (P>0.05) differences compared with control treatment. So that, those result indicate an excellent index of supplementation of date palm powder to many product especially dairy product for its numerous nutritional benefit for human health without affecting the sensory evaluation.

Table 6: The average (2trial) treatments of sensory evaluation for supplemented yoghurt with different concentration of dried date palm flour which stored at 5°C after 7 day from procssing.

Treatments	Flavor 45	Texture & consistency35	Color 10	Appearance10	Total 100
2 % DPY	44 a	33	9	9	95 a
4 % DPY	43 a	33	8	9	93 ab
6 % DPY	38 b	31	9	8	86 b
Control	43 a	31	9	9	92 ab
LSD value	4.39 *	2.64 NS	1.89 NS	1.83 NS	7.92 *

*** (P<0.05).**

Microbiological assessment

Microbiological characteristics are indicators of safety, quality and shelf life of processed yogurt. Total count, Staphylococcus, coliform, mold and yeast count of supplemented yogurt with 2, 4, and 6% date palm pomace powder were determined as shown in table 7.

The result of this study shows the lowest contamination of microorganism in supplemented yogurt with date palm pomace. It was founded that total count decreased significantly (P<0.01) by increasing the concentration of DPP addition compared with control group. There were definitely diminished growth of Staphylococcus, and Coliform bacteria in all treatments, may be due to antimicrobial effects of date palm as confirmed by (Al-Farsi, et al. 2007, Hamdia, et al. 2014). Also, there were no observations of any growth in mold content in all supplemented yogurt products. While, there were significant (P<0.01) differences in yeast numbers with 2% addition of DPP compared with control group. But, there were significant (P<0.01) reduction of yeast growth with 4 and 6% DPP addition, due to it's possess of antimicrobial effect. These finding is agreed by (Faqir, et al. 2012, Hossain, N et al, 2012) who concluded that date fruit and its extracts in the food will increase the content of antioxidants, and thus probably prevent oxidative deterioration of food. In addition of that, these results lies lower than (IQS 2006) levels.

Table 7: The microbial contamination of the different concentration of dried date palm flour in yoghurt products.

Treatments	Total count (CFU/g)	Staph (CFU/g)	Coliform (CFU/g)	Mold No. (CFU/g)	Yeast No. (CFU/g)
2 %DPY	6×10^5	Nil	Nil	Nil	2×10^5
4 % DPY	Nil	Nil	Nil	Nil	Nil
6 % DPY	Nil	Nil	Nil	Nil	Nil
Control	2×10^2	Nil	Nil	Nil	1×10^2
P-value	0.0023 **	NS	NS	NS	0.0001 **

** (P<0.01).

Conclusions

When date palm pomace (fiber) was used in yogurt processing, significant differences in texture, flavor and appearance without affecting the yogurts color scores were observed with 2 and 4% of addition. Date palm powder fibrous yogurt were preferred by panelists due to their flavor, texture and appearance and is very acceptable, and may be more acceptable by kids and children due to the quite sweetly taste and slightly color. During storage, the most variable flavor parameter was consistency index in date palm pomace may be, due to the increased amount of saccharides in it.

Date by-products (Pomace) can serve as a good source of dietary fiber, total phenolic, and antioxidant activity that could potentially be considered as inexpensive source of natural antioxidants. So that, these dates by-products pomace can be used as a functional food or functional food ingredient. Further research is needed to identify and quantify the composition of phenolic and flavonoids compounds in by-products pomace. Also, further research is required to determine the full potential range of benefits of eating dates. As a large quantity of by-product (pomace) of date syrup processing, and its contain a significant amount of bioactive phenolic and dietary fiber, one aim of this study was to confirm the production of by-product of date palm as a bioactive powder as a source of fulfillment of dietary fiber comparable to oat fiber, and can be utilized for the industrial production of dietary fiber rich concentrates, thus minimizing the waste products from fruit processing. Also, due to its low cost and abundance, dates stay a species with incredible potential and innumerable possibilities for further investigation.

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References

A.O.A.C. 2000. Association of official analytical chemists Washington D.C. USA.

Al-Farsi, M.; Alasalvar, C.; AlAbid, M.; Al-Shoaily, K.; Al-Amry, M.; and Al-Rawahy, F. 2007. Compositional characteristics of dates, syrup, and their by-products. Food Chem. 104: 943-947.

Al-Shahib, W.;and Marshall, R. 2002. Dietary fiber content of dates from 13 varieties of date palm Phyoenix dactylifera L. Int. J. Food Sci. Technol. 37:719-721.

Al-Shahib, W. and R.J. Marshall, 2003. The fruit of the date: Its possible as the best food for the future. Int. J. Food Nutr., 54: 247-259.

Bahaa, N.; Hamdia, M. and Anwar, N. (2014). Study of qualification and sensation properities by using date palm extraction and date syrup in yoghurt processing. Int. Institute Sci. Techn. And Edu. Vol. 32:49-58.

Charles, S. and Carmen, M. (2008). Carbohydrate-based fat replaceers in the modification of the rheological, textural and sensory quality of yoghurt: comparative study of the utilization of barley beta-glucan, guar gum and insulin. Intr. J. Food Sci. and Techn. 43;824-833.

Crisina, D. (2013). Influence of dietary fiber addition on some properties of yoghurt. Ovidius Univ. Annals of Chem. Vol. 24(1):17-20.

Dillard, C. and German,J. 2000. Phytochemicals: nutraceuticals and human health. J. Sci. Food Agric. 80;1744-1756.

Faqir, M.; Sardar, I.; Ahmad, H.; Muhammed, I.; Muhammed, N.; Shahzad, H. and Muhammed, S. 2012. Phytochemical characteristics of date palm (Phoenix dactylifera) fruit extracts. Pak. J. Food Sci. 22(3):117-127.

Hashim, L. Khalil, A. and Habib, H. 2008. Quality and acceptability of a set-type yogurt made from camel milk.

J. Dairy Sci. 92(3):857-862.
Hashim, I. B.; Khalil, A. H. and Afif, H. S. 2009. Quality Characteristics and consumer acceptance of yogurt fortified with date fiber. J. Dairy Sci. 92(11)5403-5407.
Hossain, N.; Fakruddin, M. and Nurul, I. (2012). Development of fruit Dahi (yoghurt) fortified with strawberry, orange and grapes juice. Am. J. Food Techn. 7(9):562-570.
Gad, A.; Kholif, A. and Sayed, A. (2010). Evaluation of the nutritional value of functional yogurt resulting from combination of date palm syrup and skim milk. Am. J. Food Techn. 5(4):250-259.
Iraqi Quality Standard IQS, (1985). Dairy products (yoghurt). Central Organization For Standardization & Quality Control / Ministry of Planning / Republic of Iraq.
Iraqi Quality Standard IQS. (2006). Microbiological limits in food, part 5, Microbiological limits of milk and milk products. Central Orgsnization for standardization and quality control/quality control/Ministry of Planning/Rep. of Iraq.
Keogh, M. and O'kennedy, B. 1998. Rheology of stirred Yogurt as affected by added milk fat, protein and hydrocolloids (vol. 63, pg 108. 1998). J. Food Sci. 63. IV-IV.
Kose, S. and Elvan, O. (2011). Changes occurring in plain, straining and winter yogurt during the storage periods. Afr
Lee, W. and Lucey, J. 2010. Formation and physical properties of yogurt. Asian-Aust. J. Anim. Sci. 23(9);1127-1136.
Ling,E. R. 2963. A Text Book of Dairy Chemistry. 3rd Edn., Chapman and Hall Ltd, London.
Miguel, A.; Fernando, M.; Gonzalo, G. and Manuela, J. (2003). Total and soluble contents of calcium, magnesium, phosphorus and zinc in yoghurts. Food Chem.80:573-578.
Nelson, J. and Trout, G. 1964. Judging dairy products. The Olsen publishing Co. Milwakee. Wis. 53212. USA.
Nulfer, D. and Boyacioglu, D. (2003). Sut urnlerinde diyet liflerinin ingreyen olarak kullanimi. Sut Endustrisinde Yeni Egilimler Sempozyumu, 22-23 Mayis, Izmir, Turkiya, 58-65.
Prior, R. and Cao, G. 2000. Antioxidant phytochemicals in fruits and vegetables; diet and health implications. Horticulture Sci. 35:588-592.
SAS. (2012). Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Cary. N.C. USA.
Tamimea, A.; Barclaya, M.; Amarowiczb, R. and McNulty, D. 1999. Kishk-a dried fermented milk/cereal mixture. 3. Nutritional composition. Lait, 79:435-448.
Wargovich, M. 2000. Anticancer properties of fruit and vegetables. Horticulture Sci. 35:573-575.

تأثير تدعيم اللبن الرائب بألياف التمور المتبقية من (في) صناعة الدبس وأثرها في الخواص النوعية للمنتج

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الملخص

التمر هي الفاكهة التي تحظى بشعبية كبيرة بين سكان دول الشرق الأوسط وذلك لتوفير المواد الغذائية الأساسية لملايين من الناس في جميع أنحاء العالم. المنتجات العرضية من تصنيع دبس التمر يمكن أن تستخدم لأغراض مختلفة، نظرا لمحتوياتها العالية من مواد البوليفينول، ومضادات الأكسدة والألياف والمعادن. لذا تم إستخدام مسحوق بثل التمر بتراكيز 2، 4، 6٪ في تدعيم اللبن. وتم تحديد الآثار المفيدة المحتملة ، الحسية، والميكروبية. أجريت مقارنات بين عينة اللبن المصنوع من تراكيز مختلفة من اللبن rheplogical لبثل التمر المجفف على الصفات المدعم ببثل التمر، وبين اللبن العادي, تبين تحسين الخواص الحسية والملمس للبن المدعم بحيث كانت خصائص جودتها مماثلة أو أكثر قبولا من اللبن العادي. وكان تركيز بثل التمر المنخفض (2 و 4٪) أكثر فعالية في تحسين الاحتفاظ بمصل اللبن من اللبن العادي panalistsمن قبل وصفاته الحسية الاخرى. أما التركيز العالي (6٪) من مسحوق بثل التمر أدى الى تحسينات كبيرة من حيث الخصائص الريولوجية والحسية من التي كانت غير مقبولة من قبل المقييمين. فضلا عن ذلك، تم harchyاللبن العادي، ولكن أثر على صفة اللون البني الفاتح والطعم اللاذع تضاءل المحتوى الميكروبي جدا في هذه المنتجات. لذا نستنتج من ذلك بإمكانية استخدام بثل التمر بنجاح من قبل المنتجين للمنتجات اللبنية والعناصر المعدنية العالية لتعديل ,المختلفة المدعمة غذائيا لاحتوائها على نسبة عالية من الألياف الغذائية، والعديد من المواد المضادة للاكسدة المكونات الضارة لمنتجات الألبان العالية في الدهون المشبعة.

الكلمات المفتاحية: متبقي التمر (بثل التمر)-اللبن المدعم غذائيا-الخواص الحسية- الخواص الفيزيوكيمائية- المحتوى الميكروبي