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Characterization of the quality of the steamed yoghurts enriched by dates flesh and date powder variety *H'loua*

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Abstract. The purpose of the present work was to investigate the effect of including date flesh and date powder in the steamed yoghurt processing on some quality during four weeks of storage. In order to obtain the powders, date variety of *H'loua* was washed, cut into small particles, and then dried at 90 °C during 2 h. Seven steamed yoghurts were manufactured: control prepared by 80 g/L sucrose, yoghurts manufactured by replacement of some quantity of sucrose by 10, 20 and 25 g/L of the date powder and yoghurts prepared by replacement of some quantity of sucrose by 60, 70 and equal quantity 80 g/L of date flesh. All samples were analyzed for some physicochemical, biochemical, microbiological and sensory characteristics at 1, 7, 15, 21 and 29 days of storage. The total or partial replacement of the sucrose by date flesh and date powder improves the nutritional quality of the yoghurts such as proteins, fat, ash, and dry mater, but the level of the total sugars was decreased. Results of microbiological analyze showed complete absence of the total and fecal coliforms, *Staphylococcus aureus*, faecal streptococci and *Salmonella* in all yoghurts prepared and throughout the storage period. Replacement of the sucrose by all types of date improves the sensory characteristics of the yoghurts included taste and texture.

Keyword: Date flesh, date powder, *H'loua*, Quality, Sucrose, Yoghurt.

Introduction

Fermented milks are popular in view of characteristic flavor, refreshing taste, improved digestibility and therapeutic value. Yoghurt a most fermented milk product, has gained great popularity throughout the world for its physical, sensorial, nutritional, probiotic, and health promoting properties [GÜNDOGDU *et al.*, 2009].

Recently, the use of natural food additives and the addition of health promoting molecules into the flavoured yoghurts have been attracting increased attention. These yoghurts are manufactured by adding flavoured syrups or fruit concentrates to cultured milk before or after incubation in order to develop novel formulations [SENGUL *et al.*, 2012]. Cakmakci and collab. [CAKMAKCI *et al.*, 2014] reported that the addition of fruit or vegetable mixtures to yoghurts formulations improves the nutritional quality and sensory properties for consumer acceptability. Yoghurts enriched with fruit of dates provides novelty in the dairy foods market and help consumers ingest nutritional foods. The date palm *Phoenix dactylifera* L. belonging to the Arecaceae family represents an important culture for many countries [AL–KHALIFAH *et al.*, 2013].

It has been cultivated across the Middle East and North Africa for over 5000 years [CHANDRASEKARAN and BAHKALI, 2013]. The fruit of the date palm is one of the most important and abundant fruits in the world. Dates contain a high percentage of sugars reaching 88 % in some varieties [AL–SHAHIB and MARSHALL, 1993] and mineral salts [AL–HOOTI *et al.*, 1997] but low in fat and virtually free from cholesterol and sodium.

The most of the carbohydrates in this product are in the form of glucose and fructose, which are easily absorbed by the human body. Hundreds of varieties having different texture, color, and flavor are available for valorization and adoption in food processing operations.

The incorporation of date fruits, powders and flesh as food ingredients is

still growing with the aim to promote the presence of dates in the modern's consumer shopping basket [SAMI *et al.*, 2017].

The objective of this work was to characterize the biochemical, microbiological, and sensory qualities of the steamed yoghurts under substitution of the sucrose by date's flesh and powder variety *H'loua.*

Material and methods

Vegetable material and preparation of the date powder. The date used in current work was variety half–soft known as *H'loua* badly exploited, cultivated in the area of Adrar (South of Algeria) and harvested in the month of December 2016. For the preparation of the date powders, this variety has been washed, cut into small particles, and then dried at 90 °C for 2 h.

Manufacture of the steamed yoghurt. Commercial frozen yoghurt starter *Streptococcus thermophilus* and *Lactobacillus* delbrueckii subsp. *bulgaricus* obtained from the GIPLait unit of Tizi, Mascara was reactivated by inoculation in sterilized milk. 1 liter of partially skimmed milk was sterilized at 100°C for 5 minutes and then the temperature was decreased to 45 °C. The starter culture was then mixed at 1:1 ratio and the baking were carried out at 45 °C until maturation (acidity of 90 to 100 °D), the fermentation was stopped by cooling to 4 °C. Seven steamed yoghurts were manufactured: control CY, DPY10, DPY20, DPY25, DFY60, DFY70 and DFY80 (table 1).

Table 1.

Raw materials used for preparation of the steamed yoghurts

Steamed yoghurts	Milk powder at 0% of fat (g/L)	Sucrose (g/L)	Date (g/L)	Dose of starter culture (%)	Partially skimmed pasteurized milk (L)
CY	54	80	0	2	1
DPY10	54	70	10	2	1
DPY20	54	60	20	2	1
DPY25	54	55	25	2	1
DFY60	54	20	60	2	1
DFY70	54	10	70	2	1
DFY80	54	0	80	2	1

For preparation of the CY, to one liter of partially skimmed pasteurized milk, 54 g of the milk powder at 0 % of fat and 80 grams of crystallized sucrose were added. The mix was heated to 95 °C for 2 min, homogenized and then rapidly cooled to 45 °C. Starter culture was added to the mix at 2 % and then agitated. Incubation was carried at 45 °C for 2 to 3 hours (until the acidity of 70–90 °D) and stopped by cooling to 4 °C.

Proximate physicochemical analyzes. Samples were analyzed chemically according to the official methods of analysis described by the Association of Official Analytical Chemist [AOAC, 2007] on the raw materials, and after 1, 7, 15, 21 and 29 days of the storage of the steamed yoghurts. The pH was measured by using a digital pH meter and titratable acidity (TA) was determined by manual titration of 10 g with standardized 0.1 N NaOH using phenolphthalein as indicator. The volume of NaOH required to neutralize the sample was recorded and used to calculate the content of titratable acids. The dry matter content was calculated after evaporation of the water present in the samples placed in an oven 105 °C for 24 h (until constant mass was obtained). The total fat content of the raw materials and yoghurts was determined by the Gerber method [WEHR and FRANK, 2004]. Total nitrogen of date and proteins content were determined by the method of Kjeldahl digestion and distillation apparatus [AOAC, 2007].

The Formaldehyde titration method was used to determine the total protein content of milk and yoghurts [CEIRWYN, 1999].

Total sugars were determined colorimetrically at 480 nm by Dubois method [DUBOIS *et al.*, 1956]. Standards were prepared with glucose solutions at different concentrations. The ash content was determined according to the AOAC

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official method by incineration five gram of sample at 600 °C for 3 h [AOAC, 2007].

Microbiological analyzes. The microbiological quality of the raw materials was determined by enumeration of total plate count (TPC) in the TGEA (Triptone Extrat Glucose Agar) after incubation for 72 h at 30 °C. All colonies were counted on those plates containing 30–300 colonies and multiplied by dilution factor. Arithmetic average was counted as total plate count per gram [ANON, 2000].

The total and fecal coliforms were counted, respectively in desoxycholate lactose agar and violet red bile lactose agar (VRBL) after 24 to 48 h at 37 °C for total coliforms and at 44 °C for faecal coliforms. *Staphylococcus aureus* on Giolitti Cantonii and Chapman agar after 24 to 48 h at 37 °C. Mean *Salmonella* in *Salmonella* agar and incubated for 24 to 48 h at 37 °C, after enrichment in Selenite–F Broth (SFB) medium for 24 to 48 h at 37 °C. Faecal streptococci were counted in Roche presumptive medium contains sodium azohydrate and Litsky confirmation medium contains sodium azohydrate and purple ethyl. Search sulfite–reducing *Clostridium* can be done by counting the sporulated forms which develop in media VF containing sodium sulphite and iron alum after 48h at 37 °C. The yeasts and molds on potato dextrose agar (PDA) supplemented with oxytetracycline after 5 days at 25 °C [MOSSEL *et al.*, 1962]. All colonies were counted on the plates containing less than 50 colonies and multiplied by dilution factor.

Sensory evaluation. All the samples were evaluated for sensory characteristics (taste, texture and acidity) by 10 panelists (students and technicians from University of Mascara, Algeria); using a point scale (5: good, 3: acceptable, 1: bad) [METIN, 2006].

Results and discussion

Proximate physicochemical and biochemical analyses. Table 2 show that the raw materials used for the preparation of the steamed yoghurts (milk powder, pasteurized milk, sucrose, date flesh and date powder variety *H'loua*) present a good biochemical and microbiological qualities.

Table 2.

Results of the raw materials

Raw Materials	Milk Powder	Pasteurized Milk	Sugars	Date Flesh	Date Powder
pH	6.50±0.1	6.48±0.2	/	5.8±0.01	5.51±0.02
Titratable acidity °D	14.4±0.3	18±0.1	/	2.41±0.1	4.3±0.2
Moisture %	04±0.4	97.10±0.05	/	13.5±0.2	4.10±0.2
Dry Mater content %	96±0.4	2.90±0.05	/	86.5±0.2	95.90±0.1
Total fat content %	1.24±0.1	16±0.2	/	1.2±0.01	2.3±0.02
Ash %	/	/	/	1.95±0.02	2.26±0.01
Total sugars %	/	/	/	84.10±0.1	85.80±0.3
Total proteins content g/L	26±0.3	/	/	3.8±0.02	2.8±0.1
Density	/	1.030	/	/	/
Total Plate Count UFC/g	2±0.2	Abs	1±0.1	800±0.4	14±0.2
Total coliforms	1 ± 0.1	Abs	Abs	Abs	Abs
Fecal coliforms	Abs	Abs	Abs	Abs	Abs
Staphylococus aureus	Abs	Abs	Abs	Abs	Abs
Fecal streptococci	Abs	Abs	Abs	Abs	Abs
S.R *Clostridium*	Abs	Abs	Abs	Abs	Abs
Salmonella	Abs	Abs	Abs	Abs	Abs
Yeasts and moulds	12±0.1	Abs	1±0.1	350±0.4	10±0.2

/. No determined, Abs: absence

During the storage period, the TA of the CY evolves gradually from 78±0.3 °D in the first days to 118±0.3 °D after 29 days of the storage (table 3). The TA of CY increases during the storage period due to the utilization of sugars by viable lactic starters and production of the lactic acid [PARMJIT and SHINDE, 2012].

Proteolytic enzymes secreted by bacteria degrade yoghurt proteins into

free amino acids and contributes actively to increase of acidity [WIDYASTUTI and FEBRISIANTOSA, 2014]. The replacement of sucrose by the date flesh or the date powder causes an increase of the acidity during storage of the steamed yoghurts.

It seems that the addition of the date to the yoghurt provide organic acids presents in the date and influence the activity of the lactic starters.

This could be also due to the presence of higher content of reducing sugar in the date which are more readily utilized by starter bacteria and produce higher acidity. Similar results were observed by several authors [YASHASWINI and ARUNKUMAR, 2016; TESFAYE and PALANIAPPAN, 2015].

Table 3.

Results of the physicochemical and biochemical analyzes of the steamed yoghurts

Parameters		Steamed yoghurts						
		CY	DPY10	DPY20	DPY25	DFY60	DFY70	DFY80
pH	1	4.78±0.2	4.62±0.1	4.56±0.1	4.50±0.1	4.51±0.1	4.48±0.1	4.37±0.2
	7	4.5±0.1	4.57±0.2	4.47±0.1	4.43±0.1	4.45±0.1	4.41±0.2	4.30±0.1
	15	4.33±0.1	4.54±0.1	4.42±0.3	4.45±0.3	4.41±0.2	4.36±0.2	4.27±0.3
	21	4±0.1	4.42±0.1	4.37±0.1	4.42±0.1	4.37±0.2	4.31±0.2	4.22±0.1
	29	3.78±0.2	4.39±0.2	4.35±0.2	4.40±0.1	4.34±0.1	4.28±0.3	4.10±0.2
Titratable acidity (°D)	1	78±0.3	83±0.1	86±0.2	101±0.2	84±0.2	88±0.3	96±0.2
	7	85±0.2	92.6±0.1	93.5±0.1	103±0.2	87±0.1	94.5±0.2	105±0.2
	15	92±0.2	103±0.2	95±0.1	110±0.1	104±0.3	107±0.1	111±0.1
	21	100±0.4	111±0.1	111±0.2	113±0.2	110±0.2	113±0.3	115±0.3
	29	118±0.3	120±0.1	124±0.2	126±0.2	115±0.1	118±0.2	125±0.1
Dry mater %	1	17±0.5	21.2±0.2	23.4±0.1	24±0.3	21±0.2	18.7±0.3	17.5±0.2
	7	15±0.4	20.1±0.3	21.2±0.2	23.2±0.1	20.4±0.1	18.2±0.1	17.1±0.3
	15	12±0.4	19.7±0.2	21±0.1	22.1±0.2	19.2±0.2	17.4±0.3	17.1±0.1
	21	7±0.5	19.4±0.1	20.3±0.2	21.7±0.3	18.7±0.3	16.8±0.1	16.2±0.2
	29	4±0.3	19±0.1	19±0.3	21.08±0.1	13.4±0.1	11.8±0.2	9.6±0.1
Total proteins %	1	4.4±0.2	4.6±0.2	4.7±0.2	4.81±0.3	4.75±0.2	4.96±0.3	4.97±0.2
	7	4.29±0.2	4.52±0.2	4.61±0.3	4.78±0.1	4.57±0.1	4.73±0.1	4.78±0.3
	15	4.15±0.1	4.39±0.1	4.49±0.2	4.76±0.2	4.55±0.2	4.62±0.3	4.67±0.1
	21	3.6±0.1	4.08±0.2	4.11±0.1	4.21±0.2	4.14±0.1	4.17±0.2	4.23±0.3
	29	1.0±0.1	3.42±0.4	3.55±0.2	3.59±0.1	3.57±0.2	3.59±0.1	3.75±0.2
Sugars g/L	1	130±0.1	122.7±0.4	116.6±0.2	108.5±0.1	125.1±0.2	119.1±0.1	115.6±0.2
	7	109±0.2	101±0.1	93.2±0.3	86±0.2	107.2±0.3	102.2±0.2	94.1±0.3
	15	88±0.4	80.1±0.2	77.4±0.1	70±0.1	82.6±0.3	77.3±0.3	74.6±0.1
	21	65±0.3	58±0.1	53±0.3	48±0.2	59.2±0.1	54.2±0.1	48.6±0.4
	29	42±0.1	37±0.3	33±0.1	32±0.2	41.3±0.3	40.1±0.3	38.2±0.3
Fat %	1	15±0.3	14.8±0.1	14.9±0.2	15±0.1	14.7±0.1	14.9±0.1	14.8±0.2
	7	14.8±0.2	14.6±0.2	14.7±0.3	14.9±0.2	14.6±0.2	14.7±0.2	14.6±0.3
	15	14.5±0.3	14.2±0.3	14.4±0.1	14.6±0.2	14.2±0.3	14.4±0.2	14.3±0.1
	21	14.2±0.2	14.1±0.3	13.8±0.2	14±0.2	13.9±0.1	14.1±0.3	14.2±0.2
	29	14.2±0.1	14±0.1	13.7±0.2	13.9±0.2	13.7±0.1	13.9±0.1	13.8±0.3
Ash %	1	1.2±0.2	1.65±0.3	1.75±0.2	1.8±0.3	1.77±0.1	1.82±0.1	1.85±0.2
	7	0.9±0.2	1.4±0.2	1.37±0.1	1.3±0.2	1.28±0.3	1.42±0.3	1.5±0.1
	15	0.77±0.1	1.2±0.3	0.89±0.1	1.08±0.2	1.01±0.1	1.21±0.2	1.32±0.3
	21	0.62±0.1	1.1±0.2	0.87±0.1	0.95±0.3	0.97±0.2	1.07±0.1	1.11±0.2
	29	0.41±0.2	0.8±0.1	0.85±0.3	0.9±0.2	1.91±0.3	1.07±0.2	1.92±0.2

Results of the evolution of the TA during storage period are in line with the results obtained by Bachir Raho and Benattouche [BACHIR RAHO and BENATTOUCHE 2013] and the findings of Kucukoner and Tarakci [KUCUKONER and TARAKCI 2003], who found that the TA values increase with the storage time. The pH of the CY decreases during the storage due to the acidification of the yoghurt by lactic acid bacteria. Yoghurts with dates present a certain stability of the pH in order to 4. According to Hess and collab. [HESS et al. 1997], the pH of the yoghurts should be in the range of 4 to 5. Our results are in agreement with the findings of Bachir Raho and Benattouche

[BACHIR RAHO and BENATTOUCHE 2013], who reported a decrease in pH of yoghurts during the storage time. The dry matter of yoghurts was represented mainly by the sugars, proteins, ash, fats and vitamins. Date flesh has 13.5±0.2 % of moisture content (86.5±0.2 of dry matter), generally dry and semi soft varieties have lower water content compared to the soft varieties. The high moisture content facilitates spoilage of dates and low moisture content will lead to dry dates not acceptable to consumers. Toutain considered dates as soft, if they present water content more than 30 %, dry if this rate is less than 10 % and half soft if the rate is between 10 and 30 % [TOUTAIN 1967].

This nomenclature permits us to classify our variety of date as half soft. The moisture content of date flesh is not agreement with 64.34 % obtained by Omowunmi and Ayoade [OMOWUNMI and AYOADE 2013] and in line with the results obtained by Abekhti and collab. [ABEKHTI *et al.,* 2013]. The moisture content of date powder 4.10±0.2 is lower to 11.0 % obtained by El–Sharnouby and collab. [EL–SHARNOUBY *et al.,* 2012].

The decrease in the dry mater was proportional to the duration of the storage due to the use of these nutrients by the ferments and microorganisms. After 29 days of storage, the dry matter content was 4±0.3 % for CY. The addition of the date (flesh or powder) to the yoghurt seems to increase the dry matter due to the richness of date by nutrients elements such as sugars, proteins, fiber, and vitamins. The pertaining results of present investigation are in agreement with the observations made by Yashaswini and Arunkumar, [YASHASWINI and ARUNKUMAR, 2016].

Proteins are nitrogenous compounds used by lactic starters and bacteria for their growth and multiplication. Fermentation of milk by lactic acid bacteria enhances its nutritional value through improved bioavailability of nutrients and production of energy, bioactive peptides and compounds which have biological actions [KOTHONEN and PIHLANTO, 2006].

They provide numerous peptides with bioactive properties, from lactic acid and flavor substances during fermentation and storage [TAMINE and DEETH, 1980].

Exopolysaccharides (EPS) producing lactic acid bacteria are naturally produced during the fermentation process. Thus, lactic starters can then perform formation of the protein network, which is responsible for yoghurt texture and addition of functionality through the capacity of EPS to improve serum retention and modulate viscosity [GENTÈS *et al.,* 2013, GEORGIEVA, *et al.,* 2018].

During the storage period, the protein content of the CY decreases progressively from 4.4±0.2 on the first day to 1.0±0.1 after four weeks of storage due to the intense development of lactic ferments and degradation leading to formation of soluble substances. The total protein content obtained was higher than 3.2 g/100 g reported by Buttriss [BUTTRISS 1997] and 3.7 g/100 g cited by Rubico and collab. [RUBICO *et al.,* 1987].

These findings are in accordance with the results of Gündoğdu and collab. [GÜNDOĞDU et al. 2009] who reported that the proteins content of yoghurts varied between 4.13 and 4.19 % and decreased during the storage time. The including of the date to the yoghurts improves the level of the proteins content. The ash content of the CY decreases gradually during the storage period and reaches a value of 0.41±0.2 after four weeks of storage. The ash content obtained was higher to 0.27 g/100g cited by Isanga and Zhang [ISANGA and ZHANG 2009] and in line with the work of Bachir Raho and Benattouche [BACHIR RAHO and BENATTOUCHE 2013].

Dates are a good source of certain minerals salts, this explains considerable ash content in flesh and powders dates respectively 1.95±0.02 and 2.26±0.01 (table 2).

The addition of the date to the yoghurts increases the level of the ash. Sucrose used in the preparation of the yoghurt and the milk sugar [lactose) are used by the lactic starters during the storage period [OMER and ELTINAY, 2009].

The sucrose present in the CY decreases from 130 g/L to 42g/L after 29 days of storage. This decrease in the amount of sugars alters the nutritional quality of the steamed control yoghurt. The results of total sugars in flesh (edible part) and powder date are very close respectively 84.10±0.1 % and 85.80±0.3 % (table 2). These results are higher to 65 % obtained by Omowunmi and Ayoade [OMOWUNMI and AYOADE 2013] and 60 % cited by Benahmed and collab. [BENAHMED et al. 2013].

The replacement of the sucrose by date powder or date flesh decrease the level of total sugars but increase amount of the nutritional elements (proteins, ash, vitamins, fiber). During the storage period, a very slight variation of the fat content of the all yoghurts prepared. The addition of the date to the yoghurts causes non–change in the level of the fat because dates are poor in the total fat.

Microbiological analyzes. Actually, the dairy products are a great medium for the growth of many spoilage and pathogenic microorganisms. Results of microbiological analyze showed complete absence of the total and fecal coliforms, *Staphylococcus aureus*, faecal streptococci and *Salmonella* in all yoghurts prepared and throughout the storage period. This absence can be explained by the respect of hygienic conditions, the effectiveness of heat treatments and the acidifying activity of the lactic ferments which inhibits the proliferation of these germs.

Concerning yeasts and molds, these microorganisms appear in the first week of storage (3 yeasts/mL), then this number increases to 7 yeasts/mL during the last week of the storage for CY. Yoghurts with flesh or powder dates are marked by the presence of the similar number of yeasts and molds (4 in the first week of storage and 10 after 29 days of storage) due to the contamination of the raw materials (dates) by these microorganisms [BACHIR RAHO and BENATOUCHE, 2013; OLMEDO *et al.*, 2013]. Our microbiological results for all yoghurts prepared are in line with the finding of several authors.

Sensory evaluation. The sensory characteristics were carried out on the acidity, taste and texture of the yoghurts.

Table 4.

Sensory evaluation of the steamed yoghurts.

Sensory characteristics	Steamed yoghurts	Good	Acceptable	Bad
Acidity	CY	70	15	15
	DPY10	65	20	15
	DPY20	65	15	20
	DPY25	50	40	10
	DFY60	60	30	10
	DFY70	50	25	25
	DFY80	45	40	20
Taste	CY	60	20	20
	DPY10	85	10	05
	DPY20	80	10	10
	DPY25	80	05	15
	DFY60	75	15	10
	DFY70	75	20	05
	DFY80	80	15	05
Texture	CY	75	15	10
	DPY10	65	20	15
	DPY20	60	15	25
	DPY25	55	30	15
	DFY60	60	25	15
	DFY70	50	30	20
	DFY80	45	35	20

According to the results presented in table 4, the CY was best appreciated by the members of the panelist and has the best acidity 70 %, followed by the

yoghurts added by lower concentrations of the powder dates DPY10 and DPY20 (65 %) then the DFY60 (60 %). Yoghurt is characterized as a fermented milk product with refreshing flavor, a slight sour taste and a smooth viscous gel [BODYFELT *et al.*, 1988, VARDANIAN, *et al.*, 2018]. These sensory properties offer quality control criteria, and therefore, yoghurt should be evaluated for acidity, taste, and texture.

Yoghurt flavor (acidity) is influenced by the presence of lactic acid and other flavoring compounds produced by culture starter during the fermentation process. The texture of yoghurt is affected by the specific rate of acid production during the fermentation process, as well as the fat content and presence of stabilizing agents such as gelatin, milk solids, and sugar. Heating the mix denatures whey proteins, increases the water–holding capacity of milk protein, and reduces synerisis in yoghurt [HEKMAT and MCMAHON, 1992].

The members of the jury appointed the yoghurts treated by different concentrations of the date powder and yoghurt added by 80 g/L of date flesh as the yoghurt with the best taste 80 %.

The taste of the yoghurt comes from the aromas produced by the lactic ferments when storing mainly diacetyl and butyric acid.

According to the panel members, the texture of the CY was best appreciated 75 %, followed by yoghurts added by lower concentrations of the flesh and powder. Our results are in line with the work of Yashaswini and Arunkumar [YASHASWINI and ARUNKUMAR 2016].

This may be due to disrupting effect of fiber in the gel, when the fiber dose is increased, thus reducing the consistency of the yoghurt with increased whey separation. Similarly, other authors reported that the rheological properties of the yoghurt were modified by the addition of dietary fiber.

Conclusions

The consumption of fermented dairy products is increasing in recent years, mainly due to its excellent nutritional and therapeutic properties. Date fruit (*Phoenix dactylifera* L.) is rich in sugars and has a high nutritional value which can be used as an ingredient in confectioneries. It is one of the best choices for milk flavouring and a safe alternative to added sugar to produce dairy products. Steamed yoghurts enriched by date palm (flesh and powder) provide novelty in the dairy foods market and help consumers ingest nutritional food that have added health benefits. The present work aimed the effect of the replacement of sucrose used during the manufacture of steamed yoghurt by date flesh and date powder at different concentrations on some quality of the yoghurts stored during four weeks.

Date fruit variety *H'loua* was selected for substitution by it richness in sugars (sucrose, glucose and fructose) and nutritional elements. The including of the date flesh and date powder in yoghurt preserves and improves the nutritional value of the product (dry mater, total proteins, total fat and ash content).

These nutrient elements were very high after 29 days of storage compared to the control yoghurt marked by decrease of these characteristics during storage period. This decrease alters the nutritional quality of the control steamed yoghurt.

The microbiological analyses for all steamed yoghurts showed total absence of the total and fecal coliforms, *Staphylococcus aureus*, faecal streptococci and *Salmonella* throughout the storage period. The fortified yoghurts have satisfactory hygienic quality.

The replacement of the sucrose by date fruit and date powder improves the sensory characteristics of the yoghurts included taste and texture. This study found that the steamed yoghurts with low concentration of flesh and powder dates were best appreciated than control yoghurt.

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