

# Utilization of date concentrate “Dibis” as functional ingredient in processing Yoghurt Like Product

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## SUMMARY

Yoghurt was made from cow’s milk fortified with different levels of date concentrate “dibis” (5%, 10% and 15%). The resultant yoghurt products were stored in a refrigerator with temperature ( $4 \pm 2^{\circ}\text{C}$ ) for ten days and the samples were analyzed every two days.

The physiochemical results revealed that the pH of the samples decreased whereas the total titratable acidity increased with increasing the concentration of the “dibis”. Total solids were found to increase with increase of date-dibis level added. The fat content of the produced yoghurts fluctuated with increase of the concentration of the “dibis”, while sugar content increased by increasing the concentration of “dibis”. The storage period has no effect on fat and sugar content. Whereas, the mineral was found to increase proportionally with the amount of “dibis” added.

The organoleptic assessment revealed that samples with 5% and 10% added “dibis” were significantly accepted ( $P \leq 0.05$ ) up to the 6<sup>th</sup> days of storage, while the samples with 15% dibis was found to be unacceptable by the panelist through out the storage period.

## INTRODUCTION

Date palm (*Phoenix dactylifera*) is one of the major fruit crops in Sudan. It has constituted an integral part of the Sudanese culture and tradition, especially in the Northern region of the country, dating back thousands of years ago. This may be taken as an indication that date fruits were pitted in large quantities for some purpose possibly for wine making. The annual production was estimated as 0.29 million tons (Dirar, 1993; A.O.A.D., 1998; Abd El Kareem, 2003). Under the hot climatic condition of many date producing countries, there is a food market for refreshing drinks. The combination of date juice and milk makes a satisfactory and nutritious drink at a ratio of 1:1 without the addition of any stabilizer at a pH range of 5.4 to 6.2 (Yousif *et al.*, 1982). On the other hand, date dibis is a good source of many important elements such as K, Na, Ca, Mg, Fe and Zn (Khalil *et al.*, 2002).

Dates, specially the semi-dry and dry varieties are nutritious fruits as they contain 78% carbohydrate on dry basis (Barreveld, 1993 quoted by Salama, 2004), and as excellent source of vitamins “A, B1, B2” and dietary fibre (salama, 2004). Functional dairy foods have undergone a major leap in recent years as food and nutrition sciences have evolved well beyond fulfillment of primary needs. Note that specifically designed and widely consumed functional dairy products might lead to longer and healthier lives of the regular consumer and a concomitant reduction of medical costs specially for the elderly (Halcota *et al.*, 2005).

The effect of functional food can derive from the combination of several compounds with biological activity. The excellent nutritional profile and health food value of milk is related to both great variety of bioactive components inherent to milk and to many metabolic products that result from biochemical activities of the microflora used in processing thereof. Fermented dairy foods provide functionality, which is related to the biological activity of lactic acid bacteria (Goldberg, 1994; De Vuyst, 2000; Alcata *et al.*, 2005).

The aim of this work was:

1. Utilization of date – concentrate “dibis” with different levels in the manufacture of date – yoghurt
2. To study of different treatment on the nutritional parameters.
- 3.

## MATERIALS AND METHODS

### **Materials:**

Fresh cow milk was purchased from a private farm. Liquid yoghurt starter culture was obtained from Khartoum dairy plant. Dibis (concentrate date syrup) was prepared from Brakawi cultivar (dry variety) according to the method of Khalil *et al.*, (2002).

### **Methods:**

Date-yoghurt preparation: fresh milk (9 liters) was divided into three equal parts (3 L each). Then the dibis was added to each part in a ratio of 5%, 10%, and 15% (w/v).the mixtures were pasteurized (90°C/1 min) and cooled to the temperature of culture addition (42°C). The starter culture was added in ratio of 3% (v/v). Then the mixtures were distributed in cups (200ml) and incubated till firm curd was formed. The produced date-yoghurts were cooled and stored at refrigerator temp (4- 7°C ± 1) for 10 days.

### **Analytical Methods:**

The samples were analyzed every two days for:

Total soluble solids (TS), pH-value, titratable acidity according to A.O.A.C. (1990) methods. Whereas fat and sugar content were determined according to Ling (1963) methods.

The minerals content of the samples were determined according to the method described by Perkin-Elmer Corporation (1994). This method described the determination of Fe, Ca, K, and P.

The samples were assessed organoleptically according to the ranking tests described by Lhekorge and Nagoddy (1985).

The experimental data were analyzed using the general linear models procedure of the statistical analysis system (SAS, 1996) significance of difference was defined at (P<0.05).

## RESULTS AND DISCUSSION

Table (2) shows the pH-Value trend during the storage period. The minimum pH-value was observed with lower concentration of date-dibis (5%). Except at day 10 where 5% & 10% date showed the same value Yoghurt prepared with 5% and 10% had a pH between 4.86 - 3.13 during the storage period. While 15% sample had pH between 5.41 – 4.73. the differences between treatments during storage were highly significant ( $P < 0.01$ ). the decrease in pH values during storage period was associated with an increase in the titratable acidity (Table 2). These findings are in accordance with those reported for Fruit-yoghurts by Venizelou *et al.*, (2000).

Increasing the concentration of date-dibis in yoghurt causes a significant increase in the total solids of the products (Table 2). The total solids were found to be 14.5%, 24% and 27% for 5%, 10%, and 15% mix respectively. Increasing the date-dibis in yoghurt mix lead to an increase in the total sugar content of the yoghurt (Table 2), from 16.86% in 5% addition up to 25.2% in 15% added date-dibis. The storage period has no significant effect on the total sugar content. These findings are in agreement with that reported for date-milk by Yousif et al (1996). The differences between treatments were highly significant ( $P \leq 0.01$ ).

Table (2), clearly indicate that the fat content of the three date-yoghurt were not affected during storage period and gave values of 3.40%, 1.37%, and 1.07% for sample added (5%, 10%, and 15%) date-dibis respectively. The differences between treatments were highly significant ( $P \leq 0.01$ ).

As to regard to mineral content (Fe, Ca, K, and P) of the different mixtures are presented in (Table 3). Storage period has no significant effect ( $P \leq 0.01$ ) on the different mineral content. Increasing the percentage of date-dibis in the yoghurt mix lead to an increase in the minerals content. Never-the less, the differences between treatments were highly significant ( $P \leq 0.01$ ). These findings agreed with those reported by Yousif et al (1996) for date-juice milk.

As far as sensory properties of date-yoghurt mixes are concerned, (Table 1), clearly indicate that all the organoleptic attributes for the mixes (5%, 10%) were found to be significantly ( $P \leq 0.05$ ) highly acceptable up to the 6<sup>th</sup> day of the storage. While in the 8<sup>th</sup> and 10<sup>th</sup> day of storage period the sample were found to be within the range. The sample prepared from the mix (15%) added date-dibis was found unacceptable during all the storage period.

**Table 1.** Effect of storage period on overall quality.

Sample	Storage period (days)					
	0	2	4	6	8	10
A	23	23	21	22	27	28
B	27	25	28	28	41	45
C	60	60	59	60	60	60

$P \leq 0.05$

20 – 30 : highly acceptable      30 – 40 : acceptable  
 40 – 50 : unacceptable          50 – 60 : highly unacceptable

**Table 2.** Effect of storage period on physiochemical characteristics of Date Yoghurt.

Sample	Storage time (Days)	Quality attributes				
		pH	T. acidity %	TSS %	Fat %	Total surgeon %
(A)	0	4.40 (± 0.35)	0.76 (± 0.11)	14.5 (± 0.00)	3.46 (± 0.15)	16.86 (± 0.15)
	2	4.33 (± 0.10)	0.74 (± 0.15)	14.5 (± 0.00)	3.40 (± 0.05)	16.85 (± 0.05)
	4	4.23 (± 0.15)	1.20 (± 0.20)	14.5 (± 0.00)	3.41 (± 0.10)	16.70 (± 0.25)
	6	3.63 (± 0.15)	1.36 (± 0.15)	14.5 (± 0.00)	3.63 (± 0.15)	16.83 (± 0.20)
	8	3.36 (± 0.15)	1.63 (± 0.20)	14.5 (± 0.00)	3.46 (± 0.15)	16.76 (± 0.11)
	10	3.13 (± 0.15)	2.33 (± 0.15)	14.5 (± 0.00)	3.26 (± 0.25)	16.80 (± 0.10)
(B)	0	4.86 (± 0.15)	0.63 (± 0.15)	24.0 (± 0.00)	1.08 (± 0.01)	20.26 (± 0.25)
	2	4.73 (± 0.15)	0.46 (± 0.15)	24.0 (± 0.00)	1.08 (± 0.01)	20.16 (± 0.15)
	4	4.36 (± 0.15)	1.30 (± 0.20)	24.0 (± 0.00)	1.06 (± 0.01)	20.13 (± 0.15)
	6	3.16 (± 0.15)	1.36 (± 0.15)	24.0 (± 0.00)	1.07 (± 0.01)	20.06 (± 0.11)
	8	4.10 (± 0.10)	1.56 (± 0.05)	24.0 (± 0.00)	1.04 (± 0.01)	20.10 (± 0.10)
	10	3.90 (± 0.15)	1.96 (± 0.05)	24.0 (± 0.00)	1.08 (± 0.01)	20.13 (± 0.15)
(C)	0	5.41 (± 0.01)	0.43 (± 0.05)	27 (± 0.00)	1.26 (± 0.11)	25.2 (± 0.25)
	2	5.41 (± 0.01)	0.50 (± 0.10)	27 (± 0.00)	1.23 (± 0.25)	25.23 (± 0.25)
	4	5.41 (± 0.02)	1.26 (± 0.25)	27 (± 0.00)	1.53 (± 0.11)	25.26 (± 0.25)
	6	5.41 (± 0.02)	1.33 (± 0.15)	27 (± 0.00)	1.63 (± 0.15)	25.20 (± 0.25)
	8	4.76 (± 0.20)	1.46 (± 0.15)	27 (± 0.00)	1.33 (± 0.15)	25.25 (± 0.25)
	10	4.73 (± 0.15)	1.70 (± 0.10)	27 (± 0.00)	1.23 (± 0.20)	25.26 (± 0.25)

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Value are means of three replica ± standard deviation (SD)

(A) = Sample added 5% date dibis. (B) = “ “ 10%  
 (C) = “ “ 15% “ “ (In this Table and in subsequent tables).

**Table 3.** Effect of storage period on Mineral content of date yoghurt.

Sample	Storage time (days)	Mineral content (mg/L)			
		Fe	Ca	K	P
( A )	0	0.196 (±4.50)	2.783 (±2.51)	0.530 (±5.77)	0.660 (±0.02)
	2	0.195 (±4.50)	2.781 (±2.51)	0.520 (±5.77)	0.650 (±0.02)
	4	0.196 (±4.50)	2.782 (±2.51)	0.500 (±5.77)	0.660 (±0.02)
	6	0.197 (±4.50)	2.783 (±2.51)	0.510 (±5.77)	0.670 (±0.02)
	8	0.197 (±4.50)	2.783 (±2.51)	0.530 (±5.77)	0.660 (±0.02)
	10	0.196 (±4.50)	2.784 (±2.51)	0.530 (±5.77)	0.660 (±0.02)
( B )	0	0.194 (±5.85)	3.171 (±0.02)	0.763 (±0.02)	0.630 (±0.00)
	2	0.195 (±5.85)	3.171 (±0.02)	0.763 (±0.02)	0.630 (±0.00)
	4	0.193 (±5.85)	3.170 (±0.02)	0.764 (±0.02)	0.610 (±0.00)
	6	0.194 (±5.85)	3.171 (±0.02)	0.762 (±0.02)	0.640 (±0.00)
	8	0.192 (±5.85)	3.170 (±0.02)	0.763 (±0.02)	0.620 (±0.00)
	10	0.194 (±5.85)	3.171 (±0.02)	0.763 (±0.02)	0.630 (±0.00)
( C )	0	0.174 (±8.14)	2.970 (±0.05)	0.930 (±0.02)	0.610 (±0.00)
	2	0.174 (±8.14)	2.970 (±0.05)	0.930 (±0.02)	0.610 (±0.00)
	4	0.173 (±8.14)	2.972 (±0.05)	0.932 (±0.02)	0.620 (±0.00)
	6	0.171 (±8.14)	2.970 (±0.05)	0.931 (±0.02)	0.630 (±0.00)
	8	0.174 (±8.14)	2.971 (±0.05)	0.932 (±0.02)	0.620 (±0.00)
	10	0.172 (±8.14)	2.970 (±0.05)	0.930 (±0.02)	0.610 (±0.00)

## CONCLUSION

This study can clearly be concluded that date-dibis can be added to the yoghurt up to 10% and to keep at refrigeration temperature ( $4^{\circ}\text{C} \pm 2$ ) up to 10 days. Therefore, the date-yoghurt like product can be consumed as functional food for different purposes due to the added nutritional value, especially minerals contents.

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## استخدام عسل البلح فى تصنيع الزبادى

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### ملخص البحث

أجريت هذه الدراسة لتصنيع منتج وظيفي من الزبادي بإضافة عسل البلح بنسب مختلفة منه (10% , 50% , 15%) من ثم تم تخزين الزبادي المنتج في درجة حرارته (  $4 \pm 2$  °) لمدة عشرة أيام. تم إجراء تحليل فسيوكيميائي لأنواع الزبادي المختلفة أثناء فترة التخزين كل يومين أشارت النتائج إلى انخفاض درجة أس الهيدروجين (pH) وارتفاع معدل الحموضة أثناء فترة التخزين كما دلت النتائج إلى أن كمية الدهون والسكر لم تتأثر بفترة التخزين بينما زادت بزيادة نسبة تركيز عسل البلح المضاف. بزيادة نسبة تركيز عسل البلح في الزبادي زادت نسبة المواد الصلبة الكلية (TSS) من نتائج هذه الدراسة لم يطرأ أي تغير في نسبة المعادن (الحديد , الكالسيوم, البوتاسيوم والفسفور) أثناء فترة التخزين. تم تقييم المنتج حسيًا باستخدام طريقة التقييم الحسي (الترتيب), وكانت عناصر التقييم هي اللون, الطعم, السكر, القوام والجودة الكلية. أشارت النتائج إلى أن الزبادي المنتج بنسب (5, 10%) كان عالي القبول أثناء الستة أيام الأولى من التخزين أما اليوم الثامن والعاشر كان مقبولاً بنسبة عادية. أما الزبادي بتركيز (15%) من عسل البلح لم يجد أي قبول أثناء فترة التخزين.