

## **A HIGH NUTRITIVE DATES PRODUCT BY USING SOME PROTEIN SOURCES**

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### **ABSTRACT**

It is well known that dates production occupies a great attention in all Arabic countries, especially Saudi Arabia. Nowadays, the production of dates is rapidly growing up. Therefore, it is very important to use the low quality dates, which are not applied in the food processing for the production of new supplemented foods. Also, the use of low quality dates tended to be utilized in producing foods with high nutritive value.

Results showed that protein percentage of date paste increased from 3.27 to 11.82 by adding casein ( 2% ) and to 9.58 by casein (1%) , followed by 9.5 and 8.75 by supplying with chickpea 5% and milk powder 10 % , respectively. The carbohydrates percentage of date paste decreased from 85.0% to 80.0, 79.76, 79.11 and 77.11 by chickpea (5%), soaked chickpea (5%), soybean (5%) and soaked chickpea (10%), respectively. With respect to fat content, data indicated that this component of date paste increased by the previous supplementation up to twice or more. While fiber content of date paste was not affected by such supplementation.

Regarding the addition of different protein sources to the date paste, which was coated with 30 % chocolate, data showed that these protein sources caused a decrement to the total sugars of the mixture from 82.0% to 45.82, 57.0, 58.12 and 62.5% by using soybean (10 %), milk powder (5 %), soybean (5%) and casein (2 %), respectively. Also reducing sugars decreased by the addition of different protein sources under study.

The product was then exposed to sensory evaluation, for general taste, color, flavor and texture. This study showed that the addition of casein at 1 and 2 % levels, milk powder (5%), soybean (5%) and milk powder (10%) gave the highest significant differences for sensory evaluation. Results also, revealed that the addition of soybean(10%) chickpea (10 and 5%) was significantly lower than that of date with chocolate alone.

In conclusion, it is of worth to state that people have to pay much attention to get benefit from the low quality dates by fortifying the nutritional value of these dates by supplying them with different good additive sources (rich in protein). Also, much attention should be paid for leguminous crops for producing new industrial food products. Date could be covered with chocolate to be edible for consumers sensory taste even they are were young or adults. Cheap dates can be used in manufacturing different industrial food products.

### **INTRODUCTION**

Dates play an important role in the life of Saudi Arabia. Dates are considered as essential food for long times because of their national values and their sanitation profits. Dates are considered as a good fruit rich in their energy . Arabia gulf and Arabian Islamic countries used dates as an important dish in major diets and especially in Ramadan month .

Dates are spread widely all over the world especially in the Arab countries .

The number of palm trees in the world is about 90 million trees. There are about 64 million trees in the Arab world, producing above 2 million tons of annually dates yearly in Arab countries. The first country was Iraq followed by Saudi Arabia, Egypt and finally Algeria .

The agriculture of palm trees for dates spread in Saudi Arabia in three zones ( East zone, Najd and El-higaz,). The East zone was the important zone which, grown in the Hail – El-Kateif and Gibreen oases.

The dates have many characteristics , being rich in fibers and contain many vitamins and minerals. Yousef ( 1979) and Sawaya et. al (1983) pointed out that the crude fibers content in the flesh of fruits in all cultivars was substantial of the khalal stage ranging from 2.8 to 8.8 % . So dates are food suitable for every age and they are a light diet for children and grown up people. The dates are the favorite natural diet . The dates are eaten as fruits or with nuts and it could be used in some sweets because they are poor in protein . Analysis proved that dried dates contain high percentage of water reaching (33%) , sugars (70.6%), fats (2.5%) and fiber (10%). So the dates contain high percentages of minerals and vitamins reaching to 1.32% and protein ratio was 2.1% (Ahmed *et al.* 1995) mentioned that total sugars represented over 50% of fruit weight at the tamr stage in some cultivars. FAO/WHO (1991) and Ahmed et.al. (1995) pointed out that fat is mainly concentrated in the skin 2.5-7.5%. Abd El-Fattah (1995) mentioned that the percentage crude protein was highest at earliest stage of development ranging from 4.3 to 5.7, then it decreased with maturation to reach from 2.3 to 3.6 at the tamr stage.

Darweesh (1985) pointed out that the average protein content of soybean seeds waste was 35.83% while chickpea contains 9.60 % protein . 1 Liter milk contains 34% protein, characterized by its animal protein which contains all the essential amino acids.

The addition of different cheap protein sources with chocolate to dates makes them edible and preferable by the consumers even they were young or adults.

The aim of this study is to raise the nutritional value of these cheap unusable dates through supplementation with different sources of high protein contents such as defatted soybean flour, crude chickpea, soaked chickpea, milk powder and casein.

## **MATERIALS AND METHODS**

### **Materials :**

Semidry dates , defatted soybeans flour, chickpea flour, casein and milk powder were brought from local market of Saudi Arabia .

### **Methods:**

#### 1-Preparation of dates products

A- Addition of defatted soybeans flour with a ratio of 5% , 10%

B- Addition of chickpea flour with a ratio of : 5% , 10%

C- Addition of soaked chickpea flour in water for 12 hours then dehydrated in oven at 56 °C and then milled and added by 5% and 10%

- D- Addition of milk powder (Nedo) with ratios of : 5% , 10%
  - E- Addition of casein with ratios of : 1% , 2%
  - F- Mixing these components with ratios of : 5% , 10% finally the net products were coated with 30% chocolate
- 2- Evaluation of moisture , protein, fiber, ash, fat, total carbohydrate, reducing, non-reducing sugars and total soluble sugars contents according to methods in the A.O.A.C (2000)
  - 3- Sensory evaluation (taste, color, odor and texture) were determined according to the method described by Nezam El-Din(1978)
  - 4- Data were subjected to analysis of variance according to the procedures outlined by Gomez and Gomez (1984)

## RESULT AND DISCUSSION

Table (1) shows that date paste has the highest protein, carbohydrates , fiber , fat and ash contents being 3.27, 85.00% , 7.66 ,1.62 and 3.15% respectively. These results agree with those of Gabriel (1981), Land *et al.* (1983) Sawaya (1983) Sawaya *et al* (1984) and Besbea *et al.* (2004) .

Defatted soybean flour contained, 46.36 protein, 31.16 carbohydrates, 5.84 fiber , 5.25 fat and 3.16% ash. On the other hand , chickpea flour contained, 24.83 protein, 64.64 carbohydrate, 5.84 fiber, 2.45 fat and 1.87% ash. These results are in accordance with those of Darweesh (1985). Casein showed, 85.00 protein , 0.02 carbohydrate 1.5 fat 2.50 ash and the fiber content was zero. For milk powder the protein, carbohydrate , fat and ash contents were 37.80 , 35.81 , 1.59 and 8.00%, respectively. As for fiber its ratio was zero .

From the aforementioned results it could be noticed that casein contained the highest percentage of protein followed by milk powder then soybean flour and chickpea in comparison to date paste . So, the nutritional value of the date paste can be fortified by the addition of other rich protein sources.

**Table (1): Chemical analysis of dates and some sources of protein (dry weight basis)**

| Source                  | Protein     | Carbohydrates | Fiber | Fat  | Ash  |
|-------------------------|-------------|---------------|-------|------|------|
| <b>Date paste</b>       | <b>3.27</b> | 85.00         | 7.66  | 1.62 | 3.15 |
| <b>Defatted soybean</b> | 46.36       | 31.16         | 5.84  | 5.25 | 3.16 |
| <b>Chickpea flour</b>   | 24.83       | 64.64         | 6.20  | 2.45 | 1.87 |
| <b>Casien</b>           | 85.00       | 0.02          | -     | 1.50 | 2.50 |
| <b>Milk Powder</b>      | 37.80       | 35.81         | -     | 1.59 | 8.00 |

Table (2) illustrates the chemical composition of various date paste products. From the aforementioned table, it is clear that the highest value of protein of the date mixed with casein 2% (11.82%) decreased in both dates mixed with casein 1% and milk powder were 9.58, 8.75%, respectively. These results are in accordance with those of Yosef *et al.*, (1987) and El-Nakhal *et al.* (1987).

The protein content was found in these dates products fortified with chickpea 5% (5.50%) followed by crude soaked chickpea 5 % (5.80%) and the lowest protein content was the dates paste (3.27%) .

The highest carbohydrates percentage of dates mixed with 5% chickpea was (80.00) followed by dates mixed with soaked chickpea 5% (79.76%). On the other hand, it was found that the lowest carbohydrates percentages were in dates mixed with casein 2% being of 72.47% .

Fiber scored its highest value for the date fortified with chickpea 10% followed by dates mixed with chickpea 5% (6.52%) and then, dates mixed with casein 1% (6.50%). The lowest percentages of fibers were found in dates mixed with casein 2% (5.00%) followed by those mixed with milk powder 10% (5.25 %). The dates mixed with soybean 10% and soaked chickpea 10% contained 5.89 and 5.89% .

Fat content has its highest ratio in the date covered with the date paste. The highest one was for dates mixed with raw casein 2% (7.66). The lowest percentage of fat was found in dates mixed with chickpea 5%.

The ash content showed the highest percentage for dates mixed with both milk powder (10%) milk powder (5%) and chickpea (10%) . Their percentages of ash content were in the dates fortified with soaked chickpea (10%), soybean (10%), soybean (5%), chickpea (10%) and casein (1%). Their corresponding percentages were 3.50, 3.50, 3.25, and 3.20 respectively, followed by dates mixed with casein 1% (3.18), casein 2% (3.05) and dates with soaked chickpea 5% ( 3.00) .

**Table (2): Chemical analysis of different date products (dry weight basis)**

| Source                         | Protein | Carbohydrates | Fiber | Fat  | Ash  |
|--------------------------------|---------|---------------|-------|------|------|
| Date paste                     | 3.27    | 85.00         | 6.99  | 1.62 | 3.15 |
| Date paste + soybean 5%        | 6.22    | 79.11         | 7.00  | 5.32 | 3.25 |
| Date paste + soybean 10%       | 8.50    | 76.11         | 5.89  | 6.00 | 3.50 |
| Date paste + chickpea 5%       | 9.50    | 80.00         | 6.52  | 4.78 | 3.20 |
| Date paste+ chickpea 10%       | 7.11    | 75.79         | 7.22  | 6.66 | 4.22 |
| Date paste+ soaked chickpea5%  | 5.80    | 79.76         | 6.11  | 5.33 | 3.00 |
| Date paste+ soaked chickpea10% | 8.50    | 77.11         | 5.89  | 7.00 | 3.50 |
| Date paste+milk powder 5%      | 7.00    | 76.08         | 6.11  | 5.66 | 5.15 |
| Date paste+milk powder 10%     | 8.75    | 73.67         | 5.25  | 6.33 | 6.00 |
| Date paste+casein 1%           | 9.58    | 75.51         | 6.50  | 5.23 | 3.18 |
| Date paste+casein 2%           | 11.82   | 72.47         | 5.00  | 7.66 | 3.05 |

Table (3) shows that total sugars were very high in chocolates with date paste (82%) followed by soaked chickpea 5%, 10%; chickpea 10%, casein 1%, chickpea 5%, milk powder 10% and casein 2% with the ratios (75.00, 71.53, 70.12, 70.00, 65.00 and 62.50%), respectively. The lowest percentages of total sugars were found in soybean 10%, milk powder 5% and soybean 5% representing 45.82 , 57.00, 58.12) respectively, being in agreement with those of Nezam El- Din ( 1978 ) and Alogaidi *et al.* (1987).

As for the non reducing sugars the highest value was found in date paste, reducing sugars decreased in all treatments than the control followed

by those mixed with chocolate (75.23%) control soaked chickpea 5% with a ratio of (67.12%), while the lowest value were in soybean 10% (40.12%).

These results coincide with AL-Shahib and Marshall (2003) who mentioned that dates contained a high percentage of carbohydrates (total sugars 44-88%).

**Table (3): Sugar contents of different date products (calculated on dry weight basis)**

| Source                                     | Total sugars | Reducing sugars | Non-reducing Sugars |
|--|--------------|-----------------|---------------------|
| Date paste                                 | 82.00        | 77.29           | 4.52                |
| Chocolates                                 | 78.34        | 72.28           | 6.11                |
| Date paste+choclates                       | 82.00        | 75.23           | 6.77                |
| Date paste+choclates +soybean 5%           | 58.12        | 51.24           | 6.88                |
| Date paste+choclates + soybean 10%         | 45.82        | 40.12           | 5.70                |
| Date paste+choclates +chick pea 5%         | 68.00        | 62.71           | 5.29                |
| Date paste+choclates +chick pea 10%        | 70.12        | 64.28           | 5.84                |
| Date paste+choclates + soaked chick pea 5% | 75.00        | 67.12           | 7.88                |
| Date paste+choclates + soaked chick pea10% | 71.53        | 63.22           | 8.31                |
| Date paste+choclates +milk powder 5%       | 57.00        | 52.25           | 4.75                |
| Date paste+choclates +milk powder 10%      | 65.00        | 61.12           | 4.75                |
| Date paste+choclates +casein 1%            | 70.00        | 66.51           | 3.88                |
| Date paste+choclates +casein 2%            | 62.50        | 58.50           | 4.00                |

The sensory evaluation is shown in Table (4). The results indicate that the date covered with chocolates scored the highest degree in taste, color, flavor, texture and general appearance.

Results reveal that the effect of the additives on the sensory evaluation of the dates was for milk powder 10%, which gave the highest significantly difference in the general appearance followed by casein 1%, casein 2% and milk powder 5% . Addition of soybean 5%, soaked chickpea 5%, chickpea 5%, chickpea 10%, soaked chickpea 10% and soybean 10% gave the lowest significantly difference compared to the dates covered with chocolates without any additives.

As for taste, the addition of casein 1%, 2%, milk powder 5%, soybean 5%, milk powder 10%, soybean 10%, soaked chickpea 5% gave the highest significant difference while the addition of chickpea 5%, soaked chickpea 10% and chickpea 10% gave the lowest significant difference compared to the date covered with chocolates . Hamada *et al.*(2002) mentioned that date pits were odor-less and had bland taste. The same table shows that for bitterness, the addition of casein 1%, milk powder 5%, casein 2%, milk powder 10%, soybean 5% and soaked chickpea 10% gave the highest significant difference in color, while the addition of chickpea 5%, 10%, soybean 10% and soaked chickpea 10% gave the lowest significant difference compared to the date covered with chocolate.

These findings are in accordance with those of Stadtman(1965)and Hamada *et al.* (2002), who found that date pits were light for casein, milk powder 5% and had dark brown color.

Addition of casein 1, 2%, milk powder 5% and soybean 5% gave accepted flavor, which was near the flavor of the dates covered with chocolates. On the other hand , the addition of chickpea with different ratios gave the lowest significant difference.

The texture gave non-significant difference in all treatments. This observation is in agreement with that of Yosef *et al.* (1987) .

From all results, it was found that the addition of different percentages of milk powder and 5% soybean scored significant differences for sensory evaluation and chemical composition . This study showed that fortifying the dates with casein , milk powder and soybean raised the food nutritive value of the dates.

**Table (4): Sensory evaluation of different date products**

| Treatment                                      | Texture | Flavour | Colour | Taste | Over all acceptability |
|--|---------|---------|--------|-------|------------------------|
| Date paste + chocolates                        | 9.60    | 9.80    | 9.70   | 9.50  | 9.80                   |
| Date paste + chocolates + soybean 5%           | 9.00    | 8.70    | 8.50   | 8.80  | 8.90                   |
| Date paste + chocolates + soybean 10%          | 8.80    | 8.50    | 7.80   | 8.20  | 7.80                   |
| Date paste + chocolates + chick pea 5%         | 8.90    | 7.30    | 8.00   | 7.20  | 8.00                   |
| Date paste + chocolates + chick pea 10%        | 8.70    | 6.20    | 8.00   | 5.50  | 8.00                   |
| Date paste + chocolates + soaked chick pea5%   | 8.50    | 7.80    | 8.30   | 8.00  | 8.50                   |
| Date paste + chocolates + soaked chick pea 10% | 8.00    | 6.00    | 7.20   | 6.50  | 8.00                   |
| Date paste + chocolates + milk powder 5%       | 9.00    | 9.00    | 9.00   | 9.00  | 9.00                   |
| Date paste + chocolates + milk powder 10%      | 9.00    | 8.70    | 8.60   | 8.50  | 9.80                   |
| Date paste + chocolates + casein 1%            | 9.50    | 9.00    | 9.00   | 9.30  | 9.20                   |
| Date paste + chocolates + casein 2%            | 9.00    | 9.00    | 8.80   | 9.00  | 9.00                   |
| L.S.D. 5% at                                   | 0.3     | 0.4     | 1.1    | 0.6   | 0.4                    |

### Conclusion

Fortification of cheap dates with high protein sources increased their nutritive value . Good care must be taken for leguminous crops and used them in the additional products . Producing some dates covered with chocolate suitable for children and adults. Using dates in producing different products.

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## إنتاج منتج عالي القيمة الغذائية من التمور باستخدام بعض المصادر المختلفة عالية البروتين

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من المعروف أن إنتاج التمور يحتل مكانة عالمية في جميع الدول العربية وخاصة المملكة العربية السعودية . بالرغم من ذلك يوجد بعض التمور رخيصة الثمن والتي لم يتم استغلالها بصورة جيدة وكذا نقص محتوى البروتين بنسبة ٢,٥ - ٣% . ولذا كان الهدف من البحث هو استخدام بعض المصادر العالية في نسبة البروتين في إنتاج منتج عالي في قيمته الغذائية عن طريق إضافة دقيق فول الصويا ، الحمص الخام والحمص المنقوع واللبن المسحوق بنسبة ٥-١٠% لكل منها مع إضافة الكازين بنسبة ١ - ٢% وتغطية المنتج بالشكولاته بنسبة ٣٠% .

وأوضحت النتائج من التحاليل الكيماوية للمصادر المختلفة للبروتين أن أعلى نسبة بروتين كانت في الكازين يليه فول الصويا المنزوع الدهن واللبن المسحوق والحمص الخام وأقل نسبة في معجون التمر . كما وجد أن أعلى نسبة كربوهيدرات كان في معجون التمر يليه الحمص الخام واللبن المسحوق وفول الصويا المنزوع الدهن وأقل نسبة كانت في الكازين .

ومن النتائج أيضاً اتضح وجود اختلافات في نسبة البروتين في المنتجات المختلفة كانت أعلى نسبة في التمر بالكازين ١٢% وفول الصويا ١٠% أما أقل نسبة وجدت في التمر والحمص المنقوع ٥% والتمر وفول الصويا ٥% .

بالنسبة للكربوهيدرات فكانت أعلى نسبة بعد الكنترول ( معجون التمر بدون إضافات ) معجون التمر بالحمص المسحوق ٥% والحمص المنقوع ٥% وفول الصويا ٥% والحمص المنقوع ١٠% أما أقل نسبة كانت في التمر بالكازين ٢% واللبن المسحوق ١٠% والكازين ١% والحمص المسحوق ١٠% . و حيث معاملة المخلوط بالشكولاته بنسبة ٣٠% أدت إلى خفض نسبة السكريات الكلية مع معاملة فول الصويا بنسبة ١٠% يليه اللبن المسحوق بنسبة ٥% وفول الصويا بنسبة ٥% والكازين بنسبة ٢% . ومن النتائج أيضاً اتضح من التقييم الحسي أن التمر المغطى بالشكولاته بدون أى إضافات أعطى أعلى درجات من حيث ( الطعم - اللون - الرائحة - القوام - الشكل العام ) على التوالي . كما أوضحت النتائج أن إضافة الكازين بنسبة ١% و٢% واللبن المسحوق بنسبة ٥% وفول الصويا بنسبة ٥% واللبن المسحوق بنسبة ١٠% فقد أعطى أعلى فرق معنوي من حيث التقييم الحسي أما إضافة فول الصويا ١٠% والحمص الخام بنسبة ١٠% و٥% فقد أعطت أقل فرق معنوي وذلك مقارنة بالكنترول ( التمر المغطى بالشكولاته بدون إضافات ) .

ومن أهم التوصيات هو تدعيم التمور رخيصة الثمن بمصادر مختلفة من البروتين لرفع قيمته الغذائية ، الاهتمام بالمحاصيل البقولية وإدخالها في منتجات جديدة غير تقليدية ، إنتاج بعض التمور المغطاة بالشكولاته تناسب ذوق الصغار والكبار ، استخدام التمور في الصناعة للمنتجات المختلفة .