Chocolate-Flavored Drink from Sweet Whey-Milk Blend Sweetened with Date Puree

AHMED M. HAMAD*, HAMAD A. AL-KANHAL and SAMEER S. AL-SHEIKH

Department of Food Science and Technology, College of Agricultural and Food Sciences, King Faisal University, P.O. Box 420, Al-Hassa 31982, Saudi Arabia

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ABSTRACT

A chocolate-flavored dairy drink sweetened with date puree was prepared by using equal parts each of sweet whey and whole milk. The blend was combined with 1.50% cocoa powder, 6% sugar (60% from date puree and 40% from table sugar), 0.05% stabilizer and 0.01% vanilla. The drink was compared with a control prepared with the same formulation except table sugar was used as a sweetener. Both products were heated to 60°C, mixed in a Waring Blender for 2 min, pasteurized at 85°C for 30 min and cooled to 4°C. Sedimentation, pH, acidity and acceptability tests were determined. The chocolate-flavored drink prepared with sweet whey-milk blend and partially sweetened with date puree appeared to be stable and highly acceptable. Chemical and physical properties of the finished product were within normal ranges.

Date palm (Phoenix dactylifera L.) is a widely grown tree in many parts of the world. The Kingdom of Saudi Arabia is well known for its date production. It is estimated that over 400,000 tons of dates are produced annually (9). Most of the dates are consumed locally with limited export to the neighboring countries. Most of the dates produced belong to the soft type category, a property that makes them unfit for packaging. Moreover, low-quality dates are not used in any other way except in the production of date syrup, paste and other by-products.

Use of date syrup in several branches of the food industry has been reported. Utilization of date syrup as a partial substitute for sugar in bakery products such as bread and cakes gave encouraging results (1,11). Rezaiz date syrup was used in ice cream making. The replacement of 50% of the sugar normally used in preparing chocolate-flavored drink (6%) was also reported (4). Orange and lemon-lime concentrates were combined with DAS whey to produce whey-flavored drinks (6). Use of DAS in combination with milk to prepare a chocolate-flavored dairy drink was quite successful (3). The dominance and popularity of chocolate milk amongst children over other flavored milk drinks was documented (13).

In this research an attempt was made to use a locally available date puree as a partial sweetener to prepare a chocolate-flavored dairy drink in which partially deproteinated sweet soft cheese whey was combined with whole milk.

MATERIALS AND METHODS

Preparation of sweet whey

Laboratory-scale batches of white soft cheese, a popular cheese variety in the Middle Eastern countries, were prepared. The whey obtained was heated to boiling and held for 15 min to inactivate rennin residues in the whey (12). The boiled whey was strained through a cheese cloth to eliminate curd particles and coagulated whey proteins. The partially deproteinated whey was cooled to 4°C and was kept refrigerated until used.

Preparation of date puree

Rezaiz date fruits were pitted, minced once through a kitchen meat mincer and stored in a plastic bag at 4°C until it was used on the same day. Sugar content of the puree was determined as degree Brix using a refractometer.

Selection of sweet-whey milk blend

A preliminary study was made to choose the most liked blending ratio of sweet-whey to whole milk. Whey was mixed with milk at different ratios: 20:80, 30:70, 40:60, 50:50 (v/v). Samples were pasteurized at 85°C for 30 min, immediately cooled and then were evaluated by a trained taste panel. The preferred whey-milk ratio (50:50) was used later in preparing the control and the experimental chocolate-flavored drink.

Selection of date-puree optimum

The optimum amount of date puree to replace a certain percentage of sugar normally used in preparing chocolate-flavored drink (6%) was determined. Date puree of the Rezaiz variety with whole milk to produce an imitation milk was also reported (4). Orange and lemon-lime concentrates were combined with DAS whey to produce whey-flavored drinks (6). Use of DAS in combination with milk to prepare a chocolate-flavored dairy drink was quite successful (3). The dominance and popularity of chocolate milk amongst children over other flavored milk drinks was documented (13).

In this research an attempt was made to use a locally available date puree as a partial sweetener to prepare a chocolate-flavored dairy drink in which partially deproteinated sweet soft cheese whey was combined with whole milk.

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The mixture was placed into a 2-L volumetric flask and made up to 2 L by adding the needed amount of whey-milk (50:50) blend. The product was homogenized in a Waring blender for 2 min. Then, the drink was dispensed into 250-ml Erlenmeyer flasks, stoppered with cotton plugs and covered with aluminum foil. The control was prepared in the same manner except that table sugar was solely used as the sweetener. The control and the experimental drinks were pasteurized in a waterbath at 85°C for 3 min, immediately cooled and kept refrigerated at 4°C until tested.

### Evaluation of the drink

**Physical and chemical evaluation.** The pH and total acidity measurements were taken initially, after processing and during a storage period of 10 d at 4°C. The composition of whey, milk and the finished product were determined (2). Percent milkfat was determined by the method of Gerber and proteins by micro-Kjeldahl. Total solids were determined by the gravimetric method. The sedimentation test was carried out by placing 50 ml of each of the control and the experimental drinks into two (100 ml) graduate cylinders. Sedimentation was checked after 3, 5, 7 and 10 d of storage.

**Sensory evaluations.** Sensory evaluation of the preliminary and final products was conducted by a trained taste panel using ranking preference and paired comparison preference tests (10).

### RESULTS AND DISCUSSION

Results of sensory evaluation of the preliminary whey-milk blend showed that the most favored ratio was 50:50. The optimum level of date puree preferred by the taste panel to replace a certain percentage of sugar normally used was 60%. Based on the above results equal volumes of sweet whey and whole milk and the replacement of 60% of the sugar with date puree were used in preparing the experimental drink.

The pH and total acidity of whole milk was 6.60 and 0.17%, respectively, as compared to 6.30 and 0.19% for sweet whey. These values are within normal ranges for milk and for sweet whey. The pH of the blend was 6.60. However, addition of the puree and the dry ingredients reduced the pH to 6.50.

The drink was stable when stored at 4°C for 10 d, and the pH dropped slightly from 6.50 to 6.40 by the seventh day. The stabilizer (P.G.X) used was quite effective at the rate 0.05%. No sedimentation or change in color occurred when the product was stored at 4°C for 10 d.

The composition of whole milk, sweet whey and the experimental drinks was carried out on the control and the experimental chocolate-flavored drink.

### Preparation of the drink

The control and the experimental chocolate-flavored drink were prepared in 2-L batches (Table 1). Partially deproteinated sweet whey with a pH 6.30 was mixed at 50:50 (v/v) with whole milk with pH 6.50. The required amount of puree was weighed and mixed with 900 ml of whey at 60°C. The mix was homogenized in a Waring blender for 2 min. The whey-date slurry was strained through a double thickness cheese cloth. Whole milk (900 ml) and dry ingredients (Table 1) were mixed with the filtrate according to the method of Webb (13). The mixture was placed into a 2-L volumetric flask and made

### TABLE 1. The ingredients and the amounts used in preparing 2 liters of chocolate-flavored drink.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole milk (3.5% fat)</td>
<td>900 ml</td>
</tr>
<tr>
<td>Sweet whey (0.5 fat)</td>
<td>900 ml</td>
</tr>
<tr>
<td>Date Puree (70° Brix)</td>
<td>103 g</td>
</tr>
<tr>
<td>Sugar</td>
<td>48 g</td>
</tr>
<tr>
<td>Cocoa powder</td>
<td>30 g</td>
</tr>
<tr>
<td>Stabilizera</td>
<td>1 g</td>
</tr>
<tr>
<td>Vanilla</td>
<td>0.2 g</td>
</tr>
</tbody>
</table>

*a P.G.X. Stabilizer/emulsifier Germantown Mfg Co., Germantown, PA.

### TABLE 2. Composition of KFU whole milk, sweet whey and sweet-whey-milk blend (50:50) flavored with chocolate.

<table>
<thead>
<tr>
<th>Sample</th>
<th>T.S. %</th>
<th>Fat %</th>
<th>Protein %</th>
</tr>
</thead>
<tbody>
<tr>
<td>KFU whole milk</td>
<td>12.6</td>
<td>3.50</td>
<td>3.65</td>
</tr>
<tr>
<td>Sweet whey</td>
<td>8.22</td>
<td>0.50</td>
<td>1.88</td>
</tr>
<tr>
<td>50:50 Whey-milk</td>
<td>16.50</td>
<td>2.20</td>
<td>3.70</td>
</tr>
<tr>
<td>chocolate drink</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 3. Results of paired comparison preference test carried out on the control and the experimental chocolate-flavored drink.

<table>
<thead>
<tr>
<th>Total no. of panelists</th>
<th>No. of panelists prefer A</th>
<th>No. of panelists prefer B</th>
<th>No. of preference for one sample to have significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

*a Control – chocolate flavored drink sweetened with 100% table sugar.

bExperimental chocolate-flavored drink sweetened with date puree-table sugar at (60:40) ratio.

A = Control drink.

B = Experimental drink.

having 70° Brix was added to the preferred whey-milk blend to replace 20, 40, 60 or 80% of the sugar used (6%). Chocolate-flavored drink samples were evaluated by a trained taste panel and the preferred percentage of puree (60%) was used in preparing the experimental drink.

**Preparation and processing of the drink**

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The composition of whole milk, sweet whey and the experimental drink is shown in Table 2. Milk components, total solids, proteins and fat were within normal limits. However, the sweet whey had relatively high percentages of protein (1.88%) and fat (0.50%) as compared to other types of whey. This might be explained by high losses of milk proteins and fat in the whey during processing of white cheese. The finished product had relatively high total solids (16.50%) as compared to whole milk alone.

Results of paired comparison test of the control and the chocolate-flavored drink partially sweetened with date puree are shown in Table 3. There was no significant...
difference between the control and the newly developed product. This means that panelists were not able to detect the added date puree.

The results obtained in this study are quite encouraging because developing such a product serves two purposes: (a) finding a new outlet for utilizing low quality and surplus dates in producing such a nutritious drink, and (b) finding a new way to benefit from sweet whey which in most instances is dumped down the drain. Another goal to be achieved from developing such a drink is to help in promoting sale of milk due to the popularity of chocolate-flavored drink among youngsters.

REFERENCES


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