

CHAPTER ONE

INTRODUCTION

Milk is a white or yellowish liquid consisting of small fat globules, suspended in a solution secreted by the mammary glands for the nutrition of the newborn .It composed of water, carbohydrate, fat, protein, minerals, and vitamins (Subhasish *et al.*, 2006).The cow's milk from poor sources of iron (Mahmmmod,1990). Fresh milk has a mild, pleasing and slightly sweet and rich flavor. The sweet flavor is contributed by the milk sugar and the richness by the fat (Michael, 1996). On the other hand milk which has been produced under less than ideal conditions or which has been abused during handling may have acquired or developed and undesirable flavor. Consumer acceptance of milk, and particularly the acceptance by children, is greatly affected by flavor which it is one of the most important qualities that determine the acceptability of milk. Even though milk is highly nutritious, people will not drink it if they do not like it (Emeritus and John 1995). Therefore, it is important that producers and others associated with the dairy industry have full knowledge of the farm factors which have an adverse effect on milk flavor.

Flavored milk advocates claim that many children will avoid the nutrition found in milk unless it has been flavored,(Wikipedia, 2007). It is a sweetened dairy drink made with milk, sugar, colorings and artificial or natural flavorings. It is often pasteurized using ultra high temperature (UHT) treatment which gives it a longer shelf-life than plain milk (Wikipedia, 2007) and it sold in the refrigerated dairy case a long side other milk products. Flavored sweetened powder or syrups which are added to plain milk are also available, (Wikipedia, 2007).

The most common flavor for flavored milk is chocolate. Which is achieved with cocoa powder, other common flavors for flavored milk include strawberry, banana, and vanilla. less commonly ,other flavors are a available , such as cookies , cream , lime , malt , mango , papaya , tropical fruits , coffee and vanilla crème .(Wikipedia,2007). Flavored milk contains the same nine essential nutrients as white milk, including calcium, vitamin D, phosphorus, riboflavin, protein, vitamin B₁₂, potassium, vitamin A, and niacin (NDC, 2011). The health benefit of flavored milk , such as improved bone health , especially in children and adolescents , reduced risk of cardiovascular disease , types 2 diabetes and lower blood pressure in adults .(GPO, 2011). Dates are one of the most popular fruit packed with an impressive list of essential nutrients, vitamins and minerals. That is required from normal growth, development and overall well –being. Fresh dates compose of soft, easily digestible flesh and simple sugars like fructose and dextrose, it is rich in dietary fiber they contain health benefiting flavored poly phenolic anti oxidants known as tannins, they are moderate sources of vitaminA. They compose antioxidants flavored such as B-carotene, lutein and Zea-xathin. Dates are an excellent source of iron, they are very good in potassium, and they are also rich in minerals like calcium, magnesium, manganese and copper. Further, the fruit has adequate level of B-complex group of vitamins as well as vitamin K. (Umesh, 2009).

The objectives of this study are:

- The effect of Date juice on the chemical composition of milk.
- The effect of Date juice on the sensory evaluation.

CHAPTER TWO

LITREATURE REVIW

2. 1milk:

Milk is the diet whose sole function in nature is food. The role of milk is to provide nourishment and protection for the mammalian young. It also has been a food source for humans being since the dawn of history. It is a very complex food with offer 100,000 molecular components(Subhasish *et al.*, 2006). It is an emulsion of fat globules and a suspension of casein micelles (casein, calcium, phosphorus), all suspended in an aqueous phase, which contains solubilised lactose, whey proteins, and some minerals, leucocytes in milk are part of the suspended phase(Subhasish *et al.*, 2006).

The composition of milk of all mammals consists of the same constituents, though in varying proportions. It is important to remember that milk is secreted as a complex mixture of these components. The properties and importance of milk are greater and more complex than the sum of it is components(Subhasish *et al.*, 2006).

2.1.1 Nutritive value of milk:

Milk has long been recognized as the most complete single food available in nature for the maintenance of health and promotion of growth of the mammals. The completeness of milk as food is appreciated when it is seen that it serves in the new born animal as the sole substitute at least for a period, for the prenatal nourishment

that the fetus was receiving through the placental circulation (Subhasish *et al.*, 2006).

Milk is an almost ideal food and considered to be a perfect food. It has high nutritive value. It supplies body building proteins, bone forming minerals, and health giving vitamins, and furnishes energy giving lactose and milk fat. About 84 to 88 percent of milk is water that holds various solids in suspension and helps to maintain body temperature, milk protein such as lacto albumin and lacto globulin are a very good source of all essential amino acids these are superior to vegetable protein . These proteins are required for the repair and maintenance of body tissues (Subhasish *et al.*, 2006). Milk fat is superior to other animal fat because it contains essential fatty acids like linoleio acid, arachidonic acid, etc. And serves as a rich source of energy. It also enhances the flavor of milk, there by enhances the consumer's acceptability of food. The main carbohydrate in milk is lactose, which makes it superior over other carbohydrate. It facilitates assimilation of calcium in the body and helps to check the growth of proteolysis by creating an acidic medium in the intestine (Subhasish *et al.*, 2006).

2.1.2 Physical and Chemical properties of milk:

The milk constituents exist partially as a solution and partially in colloidal state. In general milk is an emulsion of fat in water with some of the protein and salts as binding material or inters face substance in colloidal suspension, while milk sugar, some proteins, and salts are soluble in water(Subhasish *et al.*, 2006).

2.1.2.1 Physical properties:

2.1.2.1.1 Color:

Milk is opaque fluid varying from white to yellowish white color is due to reflection of light from casein particles render whiteness and reflection of light through fat parts render whiteness while yellow pigment carotenes render milk yellow. White milk such as Buffalo, goat, or sheep milk, yellow milk grass-fed cow's milk due to carotene while white yellowish milk stall-fed cow's milk (Subhasish *et al.*, 2006). Amal (2011) Manufactured set yoghurt by adding pulp of Date and showed that there was no significant difference observed in color.

2.1.2.1.2 Flavor:

Normal flavor of milk is the combination of taste and smell. The chlorides and lactose are mainly responsible for taste .The ratio of chlorides and lactose or percentage ratio is called chlorides-lactose number when the value or number means salty. A faint animal flavor is found in normal milk but if pronounced other flavors are present the same are called off flavor (Subhasish *et al.*, 2006). Amel (2011) reported that when added date pulp to yoghurt flavor affected by time of storage and become better in date yoghurt.

2.1.2.1.3 Taste:

Milk is sweet in taste. The sweetness is attributed to lactose the chlorides, which are salty or bitter, also control apart of milk taste. More lactose makes milk sweeter (Subhasish *et al.*, 2006). Amel (2011) documented that yoghurt manufactured by adding date reflected that the taste was getting better by the time of storage.

2.1.2.1.4 Density:

Density of a substance is it is mass (weight) per unit volume. The density of milk is taken with hydrometer at 20 °c. the method of taking the hydrometer reading is the same as in lactometer reading. The density of milk is used in conjunction with the

fat test to estimate the content of total solid. The total solid in milk are calculated by using the following formula: percentage of total solids: $.25 D + 1.21F + 0.66$, Where, $D = 1000 (D - 1)$, D = density of sample of milk at 20°C and F = fat percentage of sample (Subhasish *et al.*, 2006).

2.1.2.2 Chemical properties:

2.1.2.2.1 Acidity of milk:

Milk shows certain acidity as determined by titration with an alkaline the presence of an indicator. This is called titratable acidity of milk. The acidic nature of freshly drawn milk is due to the presence of phosphate, citrate, casein, and dissolved carbon dioxide, this acidity of milk is called natural acidity.

Natural acidity in milk is considered important from the heat stability point of view. When milk is kept under atmospheric conditions for some time an increase in acidity known as developed acidity, which is due to production of lactic acid as a result of microbial activity on lactose of milk is observed. Hence the titratable acidity is expressed as a percentage of lactic acid. The natural acidity of milk may range from 0.13 to 0.21 percent. The acidity of fresh milk varies with species, breed, individuality stage of lactation, health of the animal, etc (Subhasish *et al.*, 2006). Marwa (2011) showed that the titratable acidity of yogurt reduced when used 1% of date's powder to produced yogurt

2.1.2.2.2 Ph of milk:

The pH of normal, fresh milk ranges from 6.5 to 6.7 the milk is slightly acidic. Higher pH (alkaline) of milk indicates that the animal is suffering from udder infection, like mastitis and this milk have abnormal odor, taste, and poor heat-stability. Lower pH value (below 6.5) of milk is considered to be due to added colostrums or bacterial deterioration (Subhasish *et al.*, 2006).

2.2 Flavored milk:

Flavored milk is milk that has sugar, colorings, and (mostly inexpensive artificial) flavorings added to make it more appetizing, especially to children. It can be sold as a powder to be added to plain milk, or bought pre-mixed alongside other milk products. Flavoring can be included in a straw, and some flavored milk products are designed as dietary supplements by including additional vitamin or mineral.

Bottled spiced (masala) milk is a popular beverage in the Indian subcontinent. Other companies provide flavored beverage in the United Kingdom, which sells packaged beverages to the mobile vend or market. Australia has the highest consumption rate of flavored milk in the world, standing at 9.5 liters per Capita (Wikipedia, 2007)

2.2.1 Nutritive value and health benefits:

Nutrients of concern that many kids fail to get enough of. (DGA, 2010). On average, by the time they are 4 years old , children fall below the Dietary Guidelines for Americans recommended dairy intake(3.4) according to the Dietary Guidelines for Americans meeting dairy recommendations can have lifelong health benefits, such as improve bone health , especially in children and adolescents, current evidence shows intake of milk products, like milk , cheese and yogurt, is associated with a reduced risk of milk cardiovascular disease, type 2 diabetes and lower blood pressure in adults,(hg)

Flavored milk is a delicious way to help people all ages consume essential vitamins and nutrients important for health, (DGA, 2010), calcium helps build and maintain strong bones and teeth. It helps reduce the risk of stress fractures and osteoporosis late in life plays a role in promoting normal blood pressure, vitamin D helps absorb calcium for healthy bones, phosphorus works with calcium and vitamin D to help keep bone strong, protein helps build and maintain lean muscle, contains all

essential amino acids (The building blocks for protein), riboflavin helps convert food in to energy, plays a vital role in the development of the central nervous system, vitamin B₁₂ helps build red blood cell and helps maintain the central nervous system, potassium helps regulate the balance of fluid in the body and plays a role in maintaining a normal blood pressure, vitamin A helps the body's enzymes function normally by converting nutrients into energy, (NDC, 2011).

Added sugar in flavored milk doesn't detract from its nutritional benefits, it may help improve the appeal of nutritious foods. Dietary Guidelines for Americans recognizes that a small amount of added sugars can be used to increase the nutrient-dense foods, such as fat-free chocolate milk, (DGA, 2010).

According to American Heart Association when sugar are added to the otherwise nutrient rich food such as sugar-sweetened cereals, the quality of children's and adolescents diets improves and in the case of flavored milks ,no adverse effects on weight status were found, (Johnson, 2009). The American Academy of Pediatrics, Academy of Nutrition and Dietetics and other group agree that flavored milk is a positive trade – off for soft drinks, which are the primary source of added sugars in children diets, (SSIRM, 2009).

Although flavored milk contributes only 3% of added sugars in children's diets on average 6 and provides the same nine essential nutrients as white milk, the dairy industry has been proactively working to improve flavored milk. Since 2006 the U.S dairy industry has reduced add sugars by about 38% in the flavored milk offered in schools, (PSMPP,2011). Today, the majority of milk in schools is low-fat or fat- free, (Anneet *al*, 2007). And the majority of flavored milk is at or below 150 Calories, with an average of 134-just 31 more Calories than white milk(PSMPP, 2011).And because choice is so important, they are versions of flavored milk in the market place with no added sugars.

2.2.2 Nutrition programs:

Flavored milk fit in to the school nutrition programs which enable schools to address the nutrient, taste and health needs of the students they serve. The Dietary Guidelines of Americans (2010) specifically recommend encouraging milk consumption by children, and science supports the value of the flavored milk in children's diets, (Anne *et al*, 2007). In addition , the United State Department of Agriculture's newly updated Nutritional standards for school meal helps ensure the nation's school children meet federal recommendations for dairy consumption by requiring that either fat –free flavored milk or low-fat or fat –free white milk be offered with each school meal, (Johnson *et al*, 2008). Flavored milk can help children meet their nutrient need and can help children consume the Dietary Guideline for American recommended daily servings of dairy . Even though bans on flavored milk have been well intentioned, they many have done more nutritional harm than good. Flavored milk contributes only 3 percent of add sugar to the diets of children 2 -18 years on average, (DRI, 2003). It makes a minimal contribution to added sugar intakes of children, and removing milk from the diet would hardly affect the average intake of added sugars.

Astudy ”The Impact On Student Milk Consumption and Nutrient Intakes from Eliminating Flavored milk in School” showed that when flavored milk, such as chocolate milk ,was not offered on certain or all days of the week there was a dramatic drop in milk consumption about 35 percent, (SNAANC,2010). Reported that children who drink flavored milk have higher total milk intake compared to those who exclusively drink milk, and milk drinkers do not have higher plain milk is compared to milk non –drinkers,(Johnson, *et al*, 2008). school nutrition programs offer milk as an option because experts agree that to ensure adequate

intake of calcium, vitamin D, protein and other nutrients important for strong bones and healthy diets, it is the better for children and adolescents to drink flavored milk than avoid milk altogether.

A recent institute of medicine reported on calcium and vitamin D intake emphasized the importance of both nutrients for bone health and found that school-aged girls, from ages 9 to 18, often do not consume the recommended amount of calcium. Leading health and nutrition organizations, including the American Academy of Pediatrics, American Heart Association, American Dietetic Association, The National Medical Association, and School Nutrition Association, have all expressed their support for low-fat and fat-free milk in schools, including flavored milk. Studies show that school-aged children who drink flavored milk actually drink more milk overall, have better quality diets, do not have higher intakes of added sugar or total fat and are just as likely to be at a healthy weight compared to kids who do not consume flavored milk.

The institute of medicine, in their recommended nutrition standards for school meals (Building Blocks for Healthy Children), also supported keeping fat-free flavored milk in schools because of the critical nutrients that flavored milk provides, (NDC, 2011).

2.2.3 Factsof flavored milk:

The Nation's leading health and nutrition organizations recognize the valuable role that milk, including flavored milk, can play in meeting daily nutrient needs. The industry is proud to offer great-tasting, kid-approved flavored milk that lower in fat, contains less added sugar and has fewer calories than ever before. On average, the flavored milk offered in schools today contains just 39 Calories more than white milk. And, dairy companies have worked with schools to reduce the amount of added sugar by an average of 30 % in the last 5 years alone.

Childhood obesity is a real serious problem, one that cannot be solved by removing a single food, but only by understanding the greater need to provide kids with healthy, balanced meals and opportunities for daily physical activity, (NDC, 2011).

2.2.3 Flavors:

The most common flavor for flavored milk is chocolate, which is achieved with cocoa powder, other common flavored for flavors milk include strawberry, banana and vanilla. Less commonly, other flavors are available, such as cookies cream, lime, salt, mango, papaya, root beer, tropical fruits, coffee, and vanilla crème. With the exception of chocolate milk, many of these flavors are artificial,(Wikipedia, 2007). Healthier versions are produced using real fruit, such as pureeing bananas, strawberries and mangoes into the milk. Although thicker than traditional flavored milk, they are much healthier because they require less sugar to be added the sugar that would normally need to be added the found in the fruit.

2.2.4 Types of flavored milk:

There are many types of flavored milk according to flavor such as Banana, strawberry, lime etc, (Wikipedia, 2007).

2.2.5.1 Date Flavored Milk:

Date flavored milk, dates Often serve then as finger food or toddler snacks to may almost 3 year old daughter. They are very sweet and are high in dietary fiber, low in fat, cholesterol, and sodium (Rashmi, 2010). Dates are very popular in the Middle Eastern diet. Date shakes are very popular but those are full of ice cream or yogurt and are of thicker consistency (Rashmi, 2010). This recipe is a nice way to drink different flavored milk. Most parents added chocolate or strawberry powder /sauce to their children's milk (Rashmi, 2010). Next time try adding date to the milk. It is delicious and different. You can add date to warm milk or cold milk.

2.2.5.1.1 Date milk shake:

Date milk shakes, for the very particular, are an especially of the Palm Springs area in southern California, where many of the states dates are grown, (Elizabeth, 2014). The sound a little strange, but they are actually fabulous; dates are blended with ice cream to produce a rich creamy milk shake with a deep vanilla- honey taste, (Elizabeth, 2014). Date shakes yield 2 large or 4 small date shakes, (Elizabeth, 2014). It ingredients 1 generous cup, med jool dates, 1 cup whole milk, 0.5 tea spoon vanilla extract, 2 cups quality ice cream, vanilla or similar milk flavor, a blender,(Elizabeth, 2014).

2.3 Dates:

2.3.1 Definition:

The Dates fruit is one of the sweetest fruits around and also happens to come in many different varieties. Although dates can be eaten fresh, the fruit is very often dried, resembling raisins or plums. But whether fresh or dry, the health benefits of dates are still just as plentiful. Nutritional content of dates, if you are looking for fiber, potassium, or copper, look no further than dates. While dates are rich in many vital nutrients and there for offer many health benefits, the fruit is so small that you all need to consume a larger quantity to intake the necessary amount (Mike, 2013).

2.3.2 Chemical Analysis:

The chemical compositionof dates fruit reflected health benefitsof it which includeddry matter 76.16 % , moisture 23.84 % , fat 3.38 % , crude protein 5.8 % , crude fiber 3 % , ash 2.94 % , nitrogen free extract 86.19 % , energy (ME) 1.39 % , Fe 1.26 % , Ca 0.3 % ,Na 0.095 % , Mg 0.06 % , P 0.015 % , K 0.79 % (Khadija, 2005).

2.3.3 Health benefits of Dates

Promoting digestive health, relieving constipation- fiber is essential for promoting colon health and making for regular bowel movement. The insoluble and soluble fiber found in dates help to clean out the gastrointestinal system, allowing the colon to work at greater levels of efficiency. Some other benefits relating to fiber and colon health are reduced risks of colitis, colon cancer, and hemorrhoids, (Mike, 2013).

Boosting heart health, anti-inflammatory – Dates are rich in magnesium- a mineral known for it is anti-inflammatory, reduced blood pressure – magnesium has been shown to help lower blood pressure and again, dates are full of the mineral. Additionally, potassium is another mineral in dates that has several functions within the body, aiding with the proper workings of the heart and helping to reduce blood pressure. Reduced stroke risk-After evaluating 7 studies published over a 14 year time period, researchers found stroke risk was reduced by 9% for every every100mg of magnesium a person consumes per day,(Mike, 2013).

A Healthy Pregnancy and Delivery- further adding to the health benefits of dates, one study performed by researchers at the University of Science and Technology set out to discover how the Date fruit impacted labor parameters and delivery outcomes. After studying 69 women for a year and 1 month, the researchers found that” the consumption of date fruit in the last 4 weeks before labour significantly reduced the need for induction and augmentation of labour, and produced a more favorable, but non –significant, delivery outcome .the results warrant a randomized controlled trial. Boosting Brain Health – some studies, such as one found in JAMN Internal Medicine, found that sufficient vitamin B₆ levels are associated with improved brain performance and better test scores, (Mike, 2013).

2.3.4 Date products:

Dates are especially as a fruit. When used in baking they provide superb taste to product. It used as a component in food preparations like sweets, snacks, baking products, institutional feeding and health foods,(FAO,1997). prepared two mixture of ice cream in the normal way with the addition of date paste for one, dates to the second so as to serve the dough as a source of sweetener instead of sugar ,serving pieces of fruit in ice cream ,replaced by 17 , 34 and 50% amount of sugar normally used in manufacture of ice cream (15%) date paste ,it also furnished other ice cream mix and added a 5,10,15 % the Date part and sensory evolution results showed that it is possible to replace 50% of sugar in ice cream ,without affecting the characteristics of the products .also add 10% pieces date to the ice cream give the result a more desirable than other used the dough was in the refiner did not affect any of the time required for the initial freezing ,add dates pieces did not affect any of the freezing time ,the addition of the dough pieces and Dates in a slight increase in time crisis solubility product. There is a brief summary of the main date product,(Ahmed,*et al.*, 1986)

2.3.4.1 Home-made delicatessen:

Represented in Pastry, bakery, confectionery products, and beverage. Sandwich spreads, Party snacks, salads and appetizers,(FAO, 1997).

2.3.4.2 Semi-finished Date products:

Such as whole pitted Dates, macerated chips, Date paste and Date paste mixtures, extruded Date pieces, and diced Dates. Dehydrated Dates, date flour (dietetic baby foods). Breakfast foods (Dates with other dried fruits, cereals, almonds, and nuts),(FAO, 1997).

2.3.4.3 Ready for use date products:

Date products included sweets and snacks (date nut roll).Chocolate-coated and stuffed Dates (with nuts).Date jams, date butter or cream. Date preserves and condiments, caramel products. Date desserts (with juice, ice-cream, whipped cream, etc.(FAO, 1997).

2.3.4.4 Derived date fruit products:

Date juice and syrup. Liquid sugar (saccharin as low calorie sweetener for soft drinks) protein yeast and vinegar and fermentation products,(FAO, 1997).

CHAPTER THREE

MATERIALS AND METHODS

This study was conducted in April 2014 at the Department of Animal Production Sciences and Technology, College of Animal Production Science and Technology, Department of Dairy Sciences and Technology, Sudan University of Sciences and Technology and African City for Technology.

3.1 Materials:

Raw cow's milk samples were collected from Elhaj Youssif dairy farm, Elshegla, Dates were obtained from Khartoumand pages were obtained from African Technology Town.

3.2 Experimental procedure:

In this experiment 10 liters of milk were divided in to four parts after determined the quality of milk, the first part is the control while the other three parts are flavored with 10, 15 and 20 % Dates juice.

3.3 Processing Steps:

Processing of milk sample were carried out according to method described by (Hassan,2002). Remove the pits from the Dates and chop them, then milk samples were filtered by filter gauze then divided into four parts then milk flavored by addingthree percentages of confused Dates 0, 10, 15 and 20 % to each part and sugar 3 % respectively which add the milk and the Dates to a blender and puree until mixed, then subjected to filtration then the sample were transported to African City for Technology in container and filled in bags then packaged by wrapping and putted in bags holder and pasteurized at 65 °C for 30 minutes then placed in a refrigerator at 4 °C . After that sensory evaluation and chemical analysis were carried out in duplicate for each treatment.

3.4 Chemical analysis:

3.4.1 Determination of the Titratable Acidity:

The titratable acidity of milk samples was determined according to, (foley *et al*,1974). Ten ml of milk were measured in to a test tube and 5 drops of phenolphthalein indicator were then added, the mixture was titrated against 0.1 N sodium hydroxide solutions (BDH, Poole, UK) until a faint pink color lasting for not less than 30 seconds was obtained. the titration figure was divided by 10 to give the acidity of the samples expressed as percent lactic acid .the sample was considered spoiled when the percentage lactic acid reached 0.18 % or higher (Harding, 1995).

3.4.2 Determination of fat:

The fat content of milk samples was determined according to, (AOAC,1990).Ten ml of Sulphuric acid (90%) were transferred into Gerber tubes. Milk samples (10.94 ml) were allowed to flow gently into Gerber tube, then 1 ml of amyl alcohol was measured in the Gerber tube. The Gerber tubes were stoppered and shaken in protected stand until the contents were thoroughly mixed. The Gerber tubes were centrifuged at 1100 revolutions per minute for 5 minutes, removed from the centrifuge and placed downwards in a water bath at 65 ° c for 3 minutes. The water level was maintained above the top of the fat column in the tubes. The position of the fat column was adjusted by bringing the lower end of the bottom of the fat column to the zero mark. The fat percent in milk was read out.

3.4.3 Determination of protein:

Kjeldahl method was used for protein evaluation according to AOAC (1990). Ten ml of milk samples were weighed into Kjeldahl flask, 25 ml nitrogen free concentrated sulphuric acid and two grams of mercuric chloride (catalyst) were added. The flasks were then placed on a heater at 425°c till the color of the sample

became clear. The samples were left to cool and then diluted in 100 ml volumetric flask with distilled water, five ml of the diluted sample were mixed with 10 ml of 40 % sodium hydroxide and distilled in Markham distillatory. The distillate was received in a conical flask containing 25 ml boric acid (2%) plus a Methylene blue Bromocresol green indicator. The distillation was continued until the distillate in the conical flask was 75 ml. The distillate was titrated using 0.1 N Hydrochloric Acid. The protein percentage was calculated as follows.

$$\% \text{ Nitrogen} = T \times 0.1 \times 0.014 \times 20 / \text{weight of sample} \times 100$$

$$\% \text{ Protein} = \% \text{ Nitrogen} \times 6.38$$

Where T= is the titration.

3.4.4 Determination of total solid:

The total solid contents were estimated according to method described by AOAC, (1990) .Total solid of samples were determined by applying values of fat and lactometer reading at 20 ° c in the equation:

$$\% \text{ Total solid} = G + 5F/4 + 0.45$$

Where G=lactometer reading at 20 ° c.

F= Fat percent by Gerber method

3.4.5 Determination of density:

Density of milk samples were determined according to method describe by El Neemer (2007). Density of samples were determined by using lactometer , so part of milk sample were transferred in to a cylinder(100 ml) , then the lactometer was placed in to cylinder and continuity of the addition of milk until reached the end edge of cylinder push the lactometer up . The lactometer reading in milk was read out, and then milk temperature was also read out. This values applying in the equation:

$$\text{Density of milk} = \text{Density of water} + \text{Density of total solid}$$

Where density of total solid = G/1000

3.4.6 Determination of Crude Ash:

Crude Ash of milk samples was determined according to method described by (AOAC, 1960). Crude Ash of milk samples was determined by

Weighting the crucible empty then cleaning and dehydrating in oven. So 2 grams of an air-dried sample were placed in the crucible then the crucible was placed in the oven for 3 hours at 550 – 600 °C then the crucible was transferred into a glass vessel to dry and was left to cool then its weight stabilizes.

Weight the crucible and its ash content. The crude ash percentage was

Calculated as follows:

$$\text{Ash \%} = \frac{\text{Weight of the crucible and ash} - \text{W.C empty}}{\text{W.S}} \times 100$$

Where W.C: Weight crucible.

W.S: Weight sample after burring.

3.4.7 Determination of fiber:

The crude fiber estimation was done according to the method described by (AOAC, 1960).

3.4.7.1 Principle:

Crude fiber is determined gravimetrically after chemical digestion and solubilization of other materials present in the sample. The fiber residue weight is then corrected for ash content after ignition.

3.4.7.2 Procedure:

- 2 grams of moisture, oil free sample was weighted.
- 100 ml of glacial acetic acid was added.
- The sample was heated to the boiling point, for 40 minutes.
- The sample was filtered in crucible using Wattman paper No 4.
- The crucible containing the sample was placed in oven (105°C) over night.

- The crucible with its dry content was weighted.
- The crucible and its content were burned in (550°C) oven, for 3 hours.
- The ash weight was recorded.

3.4.7.3 Calculation:

(WC+WS oven) 150°C after dry

(WC+WS ash) 550°C after burning

$$\text{Crude fiber \%} = \frac{[(\text{WC}+\text{WS})_{\text{after dry}} - (\text{WC}+\text{WS})_{\text{after burning}}]}{\text{WS}}$$

3.5 Sensory evaluation

Sensory analysis was determined according to. (Elizabeth ,1977)which performed with 10 semi trained panelists,using a 6-point hedonic scale (color,flavor,odor,taste, texture and general acceptance).To test the coded samples of sweetened milk as a control and date flavored milk with different percentages of date juice.Samples were scored on a scale of 1-7 (1 = not acceptable, 7 = acceptable). Each attribute was evaluated in duplicate and the values were then averaged.

3.6 Statistical analysis:

Statistical analysis was carried out with SPSS program (Statistical Package for Social Sciences) version 16 (2007). Data were analyzed by ANOVA and reported as mean \pm SD. Least significance difference (LSD) was used to compare means of different treatments.

CHAPTER FOUR

Results

Results in table (1) present the effect of addition Dates juice on the chemical composition of the milk. The data showed that there was no significant different ($p>0.05$) in the moisture, total solid, crude protein, fat, and ash, whereas there was a significant different ($p<0.05$) in the iron content of Date flavored milk in comparison with the control.

Table (1): Effect of addition dates juice on the chemical composition of milk.

Chem.com Treatment	Moisture %	T.S %	Ash %	C.P%	Fat %	Fe %	Ca (mg/L)
20 %	82.69±2.63	17.31±2.63	0.88±0.42	2.64±1.49	3.15±0.49	0.14±0.02 b	14.10±2.69
15 %	81.77±1.08	18.24±1.07	0.97±0.51	2.50±1.70	3.00±0.71	0.29±0.03 a	11.88±0.18
10 %	87.05±3.46	12.96±3.47	0.70±0.22	2.69±1.10	2.80±0.42	0.10±0.04 c	11.67±0.47
0 %	85.52±0.49	14.48±0.46	0.91±0.55	2.59±1.16	2.96±0.64	0.15±0.03 b	11.82±0.78
Sig	NS	NS	NS	NS	NS	*	NS

Che.Com: Chemical Composition.

T.S: Total Solid.

C.P: Crude Protein.

NS: No Significant different.

*: Significant different.

0%: Control.

Sig: Significant

A, b, c: means within the same Colum followed by different superscript are significant ($p < 0.05$) different

Data in table (2) showed that there was no significant different ($p>0.05$) in the flavor, odor, and general acceptance, since Date flavored milk samples reflected a significant different ($p<0.01$) in taste, while control milk sample recorded a significant different ($p<0.05$) in color.

Table (2)Effect of addition dates juice on sensory evaluationof milk:-

Sensory Treatment	Color	Taste	Flavor	Odor	General acceptance
20 %	8.05±.19 b	8.60±.17 a	6.90±.20	6.80±.20	7.30±.13
15 %	8.10±.19 ^b	8.25±.22 a	6.75±.20	6.95±.19	7.45±.14
10 %	7.90±.14 ^b	8.25±.20 a	6.80±.19	6.60±.21	7.45±.15
0 %	8.80±.09 ^a	7.70±.27 ^b	6.55±.15	6.55±.21	7.50±.15
Sig	*	**	NS	NS	NS

A, b, c: means within the same Colum followed by different superscript are significant ($p<0.05$) different.

NS: No significant different ($p>0.05$)

*: Significant different ($p<0.05$).

** : Significant different ($p<0.01$).

CHAPTER FIVE

DISCUSSION

Statistical analysis showed (table 1) no significant differences ($p>0.05$) were found in the moisture, protein, total solids, fat, calcium and ash contents among the treatments this might be due to the low concentration of added Date which describe by low moisture content, protein, total solids, fat, calcium, and ash, with those are in line with the results of Amal (2011), and Marwa (2011), but there were significant differences ($p<0.05$) in iron content among the treatments, sample with 15 % Date flavored milk showed highest content in iron however there were no significant differences ($p>0.05$) between control sample and sample with 20 % Date flavored milk, whereas sample with 10 % Date flavored milk recorded the lowest content. This might be due to the usefulness of adding Date juice with suitable concentration for flavoring and increase iron content of milk, because Date has rich iron content. Also there were no significant differences ($p>0.05$) in fiber content among the treatment. This might be due to the low concentration of fiber content in the Date type.

The results (table 2) showed significant differences ($p<0.05$) in color between the treatments, which the control sample recorded highest normality in color, but there were no significant differences ($p>0.05$) among 10%, 15 % and 20 % Date flavored milk. This might be due to the addition of Dates to the milk. These results were consistent with results of Amal (2011), Marwa (2011). Also there were significant ($p<0.01$) variations in taste among the treatments, however there were no significant ($p>0.05$) differences for 10 %, 15 % and 20 % Date flavored milk. This might be due to concentration of Date juice which improves the taste in comparison with the control. These results agree with those of Amal (2011).

Although there were highest scores in flavor, odor, recorded by Date flavored milk, there were no significant ($p>0.05$) differences in flavor, odor, and general acceptance among the treatments. This might be due to low concentration of added Dates. These results are in line with the results of Amal (2011), and Marwa (2011).

CHAPTER SIX

Conclusions and Recommendation

6.1 Conclusion:

- Results from this study revealed that addition of Date's juice to milk increases the nutritive value of milk in terms of increased iron content.
- Statistical analysis showed that no significant differences in moisture, total solids, minerals, protein, calcium, fiber and fat.
- Results revealed that there were un improvement in the taste of date flavored milk
- The flavor, odor, and general acceptance of treated milk samples were not affected by addition of date juice.

6.2 Recommendation:

- Further researches also are required to examine different percentage of date juice for milk flavoring.
- Date flavored milk requires addition of gum to obtain an acceptable mouth feel.
- Low sugar contents will be used in case of using high level of Dates juice.

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