

## Effect of milk source on sensory characteristics of white soft cheese during storage

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### ABSTRACT

The study was conducted in the milk processing unit at College of Animal Production Science and Technology, Sudan University of Science and Technology, during January to September 2014, to examine the effect of milk source (cows' and goats') on sensory characteristics of white soft cheese during storage period. Twenty five liters of fresh cow's full cream milk were purchased from the farm of College of Animal Production Science and Technology, Sudan University of Science and Technology, and (25) liters of goats' milk was purchased from a private farm at Khartoum North. Two treatments were carried out for cheese processing as follows: First treatment, in which cheese was made with cows' milk and second one, cheese was made with goats' milk. After milk pasteurization, 0.02% CaCl<sub>2</sub> and 2% starter culture were added then white cheese was made and stored at 4°C for 63 days. Sensory evaluation was done for the cheese samples at 0, 7, 14, 21, 28, 35, 42, 49, 56 and 63 days intervals. The cheese statistical analysis showed that milk source significantly ( $p < 0.01$ ) affected the sensory characteristics of the cheese except texture, which showed no significant ( $p > 0.05$ ) variation, whereas storage period revealed a significant differences ( $p < 0.05$ ) in the sensory characteristics of the manufactured cheese.

### Introduction

According to Ramkant (2006) cheese is a product that made from the curd obtained from milk by coagulating the casein with the help of rennet or similar enzymes in the presence of lactic acid microorganism. Fox *et al.*, (2000) defined cheese as the fresh or ripened product obtained after coagulation and whey separation of milk, cream or partly skimmed milk, buttermilk or a mixture of these products, it can also be made from the

milk of cows, sheep, goats and camels or mixture of two of these (Herrington, 2000). Each type of milk imparts the characteristics quality of cheese made from it and the resulting cheese will diver in its proprieties, such as body, texture, and flavor (Andrew, 2010). White cheese is the most type of cheese available to the public at large quantities on the markets of Sudan, the method of its making were introduced from Egypt, or through Egypt, from Mediterranean countries such as Syria or

Greece (Dirar, 1993). It is locally known in Sudan as (Gibna Bayda) or *Gibna* which is the most famous name, and it is usually stored in containers filled with whey (Kur, 1992). Natural cheese should be stored at suitable temperatures to ensure good quality because a high temperature leads to evaporation of moisture and growth of unwanted bacteria and other faults (Ramakant, 2006).

Nasr *et al.*, (2015) concluded the milk sources significantly affected the cheese yield, where the cheese made from cow milk had higher yield compared to that obtained using goat milk. Although many studies have been carried out on manufacture soft white cheese during storage, relatively few studies have been carried out in cheese processing from different milk sources; (Alizadeh and Lavasani, 2013; Ama and Iem, 2014 and Kabsoun, 2016).

Therefore, the main aim of this study was to evaluate the sensory characteristics of cheese using cows' and goats' milks during storage period.

## **Materials and methods**

### **Materials**

Fresh whole cow milk (25 liters) was brought from College of Animal Production Science and Technology farm, Sudan University of Science and Technology, while fresh *Saanen* goats' milk (25 liters) was brought from a private farm at Hillat Kuku, Khartoum, Sudan. Both milks were filtered and kept at 4°C. Clean and fine sodium chloride was purchased from local market. Rennet powder was obtained from Chr. Hansen's lab, Denmark.

### **Cheese making**

The cheese was produced according to the following procedure of Ibrahim (2003) with slight modifications. Briefly, 25 liters of fresh cows' and goats' milk were heated at 72°C for 15 second and then cooled to 45°C and CaCl<sub>2</sub> was added at the rate of 0.02%. Then, starter culture of lactic acid

(*Lactobacillus bulgaricus* and *Lactobacillus thermophilus*) were added at the rate of 2.0% and left for 30 minutes to develop acidity. Rennet tablets (one tablet / 50 liter milk) were added to the milk. The milk were mixed and left until coagulation completed. After coagulation the curd was cut vertically and horizontally into 5 cm<sup>3</sup> with a sharp knife accompanied by addition of 3 % NaCl for each treatment. The whey obtained from the cheese curd was drained and the curd was poured into small wooden boxes lined with cloth and pressed overnight. The curd was removed from the wooden boxes and cut into cubes of 10×5×5 cm<sup>3</sup> and 100 grams of each cheese sample were placed in plastic containers (of 250gm capacity) and sealed. The cheese samples were stored for 0, 7, 14, 21, 28, 35, 42, 49, 56 and 63 days at 4°C.

### **Sensory evaluation:**

The quality of cheese samples stored in refrigerator were judged by 10 untrained panelists for colour, flavor, texture and saltiness using sensory evaluation sheet as describes by Larmond, (1977).

### **Statistical analysis:**

Statistical analysis programme (SPSS) Social Package for Statistical Science (version. 17) was used. General Linear Model was used to determine the effect of milk source and storage period on the organoleptic assessment of white cheese. Least significant difference was used for the mean separation between the treatments.

### **Results and Discussion:**

#### **Effect of milk source on sensory characteristics of white soft cheese:**

The colour and flavor of the white cheese was significantly (P<0.01) affected by milk source. Moreover, saltiness of the cheese was significantly (P<0.05) affected by milk source while milk source was not significantly (P>0.05) affected the texture of white cheese (table 1). The present results were in agreement with Abdalla and Abdel Razig (1997) they stated that the best cheese

was obtained from cows' milk, followed by goats' milk and mixed one; and also with the findings of Queiroga *et al.*, (2013) who differences in sensory characteristics of Coalho cheese. The variation of colour and flavor of cheese may be attributed to the

concluded that cows' and goats' milks had significant

variation of fat composition of milk (Carpino *et al.*, 2004).

Table 1 Effect of milk source on sensory characteristics of white soft cheese:

Sensory characteristics	Milk source		
	Cow M±SD	Goat M±SD	L.S
Colour	6.55 ± 1.07 <sup>a</sup>	6.05 ± 1.63 <sup>b</sup>	**
Flavor	6.34 ± 2.09 <sup>a</sup>	5.57 ± 2.32 <sup>b</sup>	**
Texture	6.67 ± 1.75 <sup>a</sup>	6.60 ± 1.98 <sup>b</sup>	N.S
Saltiness	4.71 ± 1.76 <sup>b</sup>	5.13 ± 1.93 <sup>a</sup>	*

Mean values bearing different superscripts within rows are significantly different ( $p \leq 0.05$ ).

N.S: Not significant

### Effect of storage period on sensory characteristics of the white cheese:

The storage period affected the colour, flavor and saltiness of the white cheese significantly ( $P < 0.05$ ) (Table 2). The texture of the white cheese samples was significantly ( $P < 0.01$ ) affected by the storage period. These findings were in line with El Owni and Hamid (2008), Dhuol and Hamid (2013) and Hamid (2014) who studied the sensory characteristics of white

soft cheese during storage, this might be attributed to fact that the sensory characteristics scores increased generally during ripening of cheese (Tarakci and Kuckoner, 2006). The present results were disagreement with Khir *et al.*, (2011) who stated that storage had not significantly affected the sensory characteristics of white soft cheese.

Table 2 Effect of storage period on sensory characteristics of white soft cheese:

Storage period (wks)	Colour	Flavour	Texture	Saltiness
Day 0	6.70 ± 0.97 <sup>ab</sup>	6.75 ± 1.88 <sup>ab</sup>	7.50 ± 1.55 <sup>a</sup>	5.40 ± 1.58 <sup>ab</sup>
Wk 1	6.80 ± 0.76 <sup>a</sup>	5.50 ± 2.47 <sup>bcef</sup>	6.60 ± 1.98 <sup>abcde</sup>	5.00 ± 2.22 <sup>abcd</sup>
Wk 2	5.85 ± 1.92 <sup>acd</sup>	6.00 ± 1.97 <sup>abc</sup>	6.70 ± 2.15 <sup>abcd</sup>	4.55 ± 2.10 <sup>bcd</sup>
Wk 3	6.50 ± 1.09 <sup>ac</sup>	6.95 ± 1.72 <sup>a</sup>	7.00 ± 1.63 <sup>ab</sup>	5.45 ± 1.32 <sup>a</sup>
Wk 4	5.85 ± 1.97 <sup>abcd</sup>	5.60 ± 2.69 <sup>bcef</sup>	6.85 ± 1.7 <sup>abc</sup>	4.45 ± 1.92 <sup>bcd</sup>
Wk 5	6.50 ± 1.26 <sup>ac</sup>	6.00 ± 2.17 <sup>abc</sup>	6.10 ± 1.69 <sup>bcd</sup>	5.30 ± 1.60 <sup>abc</sup>
Wk 6	6.20 ± 1.42 <sup>acd</sup>	5.70 ± 2.20 <sup>bcd</sup>	6.40 ± 1.7 <sup>bcd</sup>	4.70 ± 1.47 <sup>abcd</sup>
Wk 7	6.10 ± 1.43 <sup>abcd</sup>	5.65 ± 2.37 <sup>bcd</sup>	6.35 ± 1.83 <sup>bcd</sup>	4.75 ± 2.08 <sup>abcd</sup>
Wk 8	6.25 ± 1.41 <sup>acd</sup>	5.50 ± 2.30 <sup>bcef</sup>	6.15 ± 2.21 <sup>bcd</sup>	4.65 ± 2.35 <sup>abcd</sup>
Wk 9	6.05 ± 1.43 <sup>acd</sup>	5.80 ± 2.34 <sup>bc</sup>	6.70 ± 1.79 <sup>abcd</sup>	4.95 ± 1.54 <sup>abcd</sup>
L.S	*	*	**	*

\*: significant ( $p \leq 0.05$ )

\*\*: significant ( $p \leq 0.01$ )

L.S = Level of significance

### Effect of milk source and storage on sensory characteristics of white soft cheese:

Results showed no significant differences on sensory characteristics except for flavour

(Table 3). Similar results were obtained by Abdalla and Abdel Razig (1997) who studied the sensory characteristics of white soft cheese made from cows', goats' and mixed milks. Also, results were agreement

with Bilal (2000) who concluded that the highest organoleptic evaluations were in cheese made of cows' milk, mixed with soy

milk and the lowest with soy milk where storage period improved the quality of cheese.

Table 3 Effect of interaction between milk source and storage period on sensory characteristics of white soft cheese:

Storage period (wks)	Sensory characteristics							
	Colour		Flavour		Texture		Saltiness	
	Cow	Goat	Cow	Goat	Cow	Goat	Cow	Goat
Day 0	7.00	6.40	7.00	6.50	7.60	7.40	5.00	5.80
Wk 1	7.00	6.60	6.00	5.00	6.70	6.50	4.90	5.10
Wk 2	5.90	5.80	6.30	5.70	6.60	6.80	4.40	4.70
Wk 3	6.50	6.50	6.80	7.10	6.90	7.10	5.00	5.90
Wk 4	6.20	5.50	6.30	4.90	6.70	7.00	4.20	4.70
Wk 5	6.70	6.30	6.40	5.60	6.50	5.70	5.00	5.60
Wk 6	6.20	6.20	6.00	5.40	6.60	6.20	4.60	4.80
Wk 7	6.60	5.60	5.80	5.50	6.60	6.10	4.70	4.80
Wk 8	6.40	6.10	5.40	5.60	5.90	6.40	4.60	4.70
Wk 9	6.60	5.50	7.20	4.40	6.60	6.80	4.70	5.20
S.E	0.30		0.43		0.30		0.34	
L.S	N.S		*		N.S		N.S	

S.E = Standard error

L.S = Level of significance for interaction

N.S: Not significant

### Conclusion

The study concluded that milk source had significant effect on the sensory attributes of the white cheese mainly the colour and flavour of the cheese. Therefore the storage period showed great variations in the sensory

characters of the white cheese during the storage.

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