Dedication

I dedicate this humble work to

- My father and mother's souls -
- My family for an encouragement during my study -
- My teachers who helped me in building my bits of knowledge -
 Those who took care of me and taught me much about dealing and -
  conducting
- Those who gave me a hand on the way of life -
  My colleagues and students -
- Sign of thank, appreciation, respect and love to all of them
Acknowledgments

Having completed this work my first faithful thank and praise are to be to Allah for providing me health, strength and patience to conduct the present study.

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Research Abstract

This research was conducted to study compositional variation and nutritive value of pasteurized and sterile market milk processed by different dairy plants in the Republic of Sudan and Kingdom of Saudi Arabia (KSA).

The milk factories producing pasteurized milk subject of this study are: Kenana and Capo in the Sudan, Nadec, Almarai and Alsafi in Kingdom of Saudi Arabia (KSA).

The method used for processing pasteurized milk is the high-temperature short time (H.T.S.T) method.

For the sterile milk the factories are Taza and Best of the Sudan and Saudia and Safio of KSA.

The applied method for processing sterile milk is Ultra – High temperature (UHT) method.

One hundred fifty (150) samples of pasteurized milk were collected randomly from different sales points in the markets of Khartoum (Sudan) and Jeddah, Elriyadh and ELnamas (KSA), 30 samples from each milk factory.

Also (120) samples of sterile milk were collected in the same way from the above mentioned areas.

The samples were then subjected to laboratory tests for protein, fat, lactose, total solids, ash and water.

The results obtained were then analyzed statistically and accordingly.
Components and Nutritive Value of Pasteurized Milk

Milk Fat

The average fat % of the pasteurized milk is 4.5 % ± 0.07, 4.3%±0.16, 3.2 % ±0 .03, 3.1 % ± 0.02 and 3.0% ± 0.04 for the milk factories Kenana, Capo, Nadec, ALmarai and ALsafi respectively. The statistical analysis showed a significant difference between the averages of the fat %( percentage) produced by the different milk factories. The pasteurized milk produced by the Sudanese factories (Kenana and Capo) contains high fat levels compared with that of KSA factories. Accordingly, the pasteurized milk produced by the Sudanese factories has higher nutritive values in term of fat –content.

Milk Protein

The average protein% is 3.14% ±0.05 ,3.08 %±0.02 ,3.07%±0.08 , 3.05 % ± .01 and 3.02 % ± 0.27 for the pasteurized milk of Nadec, Capo, ALmarai, ALsafi and Kenana respectively. The statistical analysis indicated a significant difference between the average protein % of Nadec factory and that of all other factories. According to the protein – content in the milk produced by these factories, Nadec factory pasteurized milk is high nutritious in term of protein than that of the other factories.

Milk Lactose

The results obtained show an average lactose % of 4.8 % ±0.03 , 4.73 % ±0 .01, 4.72 % ±0 .02, 4.4 % ±0.03 and 4.3 % ± 0.42 in the pasteurized milk produced by Alsafi, Nadec, ALmarai, Capo and Kenana respectively. The statistical analysis showed a significant variation between the average of the lactose % of the KSA milk factories, but a significant – variation is recorded between the average lactose of KSA and Sudan milk factories.

Milk Ash

The average ash % is found as 0.8 % ±0.06 , 0.7 % ±0 .05, 0.60 % ±0 .07, 0.60 ± 0.01 and 0.60 ± 0.06 for Alsafi, Almarai, Nadec, Capo and Kenana respectively.
Statistically a significant variation was recorded between the average ash % of Alsafi milk and that of all other milk factories. Hence the pasteurized milk produced by ALsafi factory is rich in minerals compared with the milk produced by the other factories and thus has a higher nutritive value in term of ash.

**Milk Total Solid and Water**

The average total solids % of the pasteurized milk of Kenana, Capo, Nadec, ALsafi and ALmarai is 12.45 % ±0.82, 12.38% ±0.22, 11.67 % ±0.16, 11.6% ± 0.14 and 11.6 % ± 0.17. The statistical analysis showed a significant difference between the average of total solids % of Kenana milk and that of the other milk factories.

High water – content in pasteurized milk is associated with low concentration of the total solids. So, the highest water content is found in the milk of ALmarai, ALsafi, and Nadec factories respectively (88.4 % ± 0.05, 88.4 % ±0.09 and 88.3 % ± 0.03). The pasteurized milk of Kenana and Capo has a low water content (87.6% ±0.68 and 87.6 % ± 0.15) and thus high concentration of the total solids. The statistical analysis shows a significant difference between water content of all factories.

According to the obtained and discussed results the pasteurized milk produced by the factories of the Republic of Sudan has a high nutritive value than that produced in KSA. The variation in the composition polymorphism of the pasteurized milk produced by the mentioned factories may be related to the different components contents of raw milk before processing, which are in turn affected by so many factors or to milk treatment during processing such as standardization, skimming and others.

**Components and Nutritive Value of Sterile Milk**

**Milk Fat**

The average fat % of the sterile milk according to the results is 3.4 % ±0.14, 3.2 % ± 0.17, 3.2 % ± 0.08 and 3.1 ± 0.02 for Taza, Best, Safio and Alsaudia milk respectively. The statistical analysis indicates a significant difference between the average fat % of the sterile milk produced. The sterile milk produced by Taza factory has the highest fat content followed by Best, Safio and Alsaudia and accordingly Taza milk has higher nutritive value in term of fat, when compared with other milk. The nutritive value of milk in general gains its nutritive value from its fat – content.
The variation in the fat content of the produced sterile milk may be related to the origin fat content of the raw milk or the treatment procedures during processing.

**Milk Protein**

The average protein % of the sterile milk produced by Safio, Best, Alsaudia and Taza is 3.1 % ±0.09 , 3.1 %± 0.38 , 3.0 % ± 0.01 and 2.9 ±0.18 The statistical analysis showed significant difference between the average % of the sterile milk produced. Comparing the protein content of the sterile milk produced by the four factories, it is obvious that it has the same nutritive value in term of protein.

**Milk Lactose**

Sterile milk with higher lactose content is produced by Saudia followed by Safio, Taza, and Best with an average % of 4.9 % ±0.02 , 4.6 % ± 0.03 , 4.2 % ± 0.17 and 3.7 % ± 0.01 respectively. The statistical analysis indicated a high significant difference between the average lactose % of the sterile milk produced by all factories. The nutritive value of the sterile milk produced by Saudia is higher compares with Safio, Taza and Best respectively.

**Milk Ash**

To order the average ash % from high to low of the sterile milk produced by the different factories, comes first Safio, then Saudia, Taza and Best with an average % of 0.8 % ± 0.09 , 0.6 % ±0.03 , 0.6 % ± 0.03 and 0.4 % ±0.13 respectively. The statistical analysis showed a high significant difference between the average ash % of Safio sterile milk and the milk of the other factories. It can be noticed that the ash content of the sterile milk produced Saudia, Taza and Best has a low ash – content. From nutritional point of view the sterile milk produced by Safio factory has the highest nutritive value, when ash – content is considered.

**Milk Total Solids and Water**

The average total solids % of Safio, Saudia, Taza and Best sterile milk is found as 11.7 % ±0.29 ,11.6 % ± 0.08 , 11.1 % ± 0.51 and 10.4 % ± 0.7.
The average water % for the same factories and in the same order is 88.3 % ± 0.09, 88.4 % ± 0.03, 88.9 % ± .17 and 89.5 % ± 0.18. A significant variation is noticed between the average total solids and water % between Safio, Saudia and Taza and that of Best sterile milk. In this case the sterile milk produced by Safio factory has the higher nutritive value compared with others considering the total solids content. The results indicate clearly that the sterile milk produced by the KSA milk factories is highly nutritious than that of Sudan milk factories. It worth to mention that the concentration of the different elements in the raw milk and the way the processing methods (pasteurization or sterilization) are achieved determine the nutritive value of the consumed liquid milk.

Finally certain recommendations are given in this aspect.
أظهرت نتائج التحليل الإحصائي وجود فروقات معنوية بين متوسطات النسبة المئوية للدهن. أجري الحليب المبستر المنتج بواسطة الصانع السوداني كان له نسباً أعلى من الدهن مقارنة بصناع السعودية وبالتالي فهو ذو قيمة غذائية أعلى من ناحية الدهن مقارنة بحليب الصانع السعودي المستر 0

**بوتين الحليب**

بلغ متوسط النسبة المئوية للبروتين 3.07 ± 0.08 % على التوالي 0

أظهر التحليل الإحصائي وجود فروقات معنوية بين متوسط النسبة المئوية للبروتين حليب كل من الصنع نادك، كابو، المراعي، الصافي وكاتانة إلى جانب تقليل درجة الدهن مقارنة بحليب الصانع السعودي المستر 0

**سكر الألكتروز**

أظهرت النتائج أن متوسط النسبة المئويةسكر الألكتروز هو 4.8 ± 0.03 % على التوالي 0

**المواد**

متوسط النسبة المئوية للرماد 0.6 ± 0.06 % على التوالي 0

أظهر التحليل الإحصائي وجود فروقات معنوية بين متوسط النسبة المئوية للرماد في حليب الصانع السوداني مقارنة بحليب الصانع السعودي مستر والبحليب المنتج بواسطة الصانع السوداني 0

**المواد الكلية والصفراء**

بلغ متوسط النسبة المئوية للمواد الكلية الكلية في حليب كل من الصنع نادك، كابو، المراعي، الصافي وكاتانة 11.6 ± 0.17 % على التوالي 0

أظهر التحليل الإحصائي وجود فروقات معنوية بين متوسط النسبة المئوية للمواد الكلية الكلية لحليب كل من الصنع نادك، كابو، المراعي، الصافي وكاتانة 0

بين هناك ارتباط بين الزيت العالي للصفراء، وأخذ تتركيز المواد الكلية بالحليب حيث تم رصد نسب محتوى

للصفراء جلب كل من الصنع نادك، كابو، المراعي، الصافي، كابو 0

المحتوى منخفض (87.6 % ± 0.15 %) مما يعني نسبة تركيز أعلى للمواد الكلية. 0

أظهر التحليل الإحصائي وجود فروقات معنوية بين متوسط النسبة المئوية للصفراء في جميع الصناعات 0

يجب أن يكون النتائج متواضعة ومتناوبة ينتج أن الحليب المستر المنتج للصانع السوداني ذو قيمة غذائية أعلى من ذلك المنتج بواسطة الصانع السعودي 0
الاختلاف في تعداد العينات وفي القيمة الغذائية للحليب المبستر لهذه الصناع بعض القيمة الغذائية قد يعي لمحته تكوين الحليب المختلفة في الحليب الخام قبل الصنع والذي يتأثر بعوامل عدة أو المكونات التي تجري على الحليب أثناء الصنع مثل : تخليل نسبة الدهن، ترنيخ الدهن وغيرها.

المكونات والقيمة الغذائية للحليب المبستر

الدهن

النسبة حسب النتائج بلغ متوسط النسبة المئوية للدهن 3.2 ± 0.08، 3.1±0.17، 3.4 ± 0.17، 0.17 ± 3.4 ± 0.14.

المكونات والقيمة الغذائية للحليب المبستر

البروتين

متوسط النسبة المئوية للبروتين لحليب صافي، بوست، السعودية وبست، السعودية وطرفة هي 2.9 ± 0.14، 3.0 ± 0.01، 3.1 ± 0.38، 3.2 ± 0.38.

اللكتوز

زيادة نسبة السكر في الحليب المبستر بسبب الصناع المصنعة من التحليل الإحصائي وجود فروقات معينة بين متوسط النسبة المئوية لللكتوز للمكون المعقم. مقارنة محتوى البروتين للحليب المبستر على القيمة الغذائية من حيث البروتين 0.09, 0.51, 0.7 ± %

الرماد

متوسط النسبة المئوية للرماد على النحو التوالي 0.09, 0.6 ± 0.06, 0.07 ± 0.03 ± 0.8, 0.32 ± 0.03 0.8 ± %, 0.51 ± 11.6, 0.7 ± %

المكونات والقيمة الغذائية للحليب المبستر

المواد الكلية والملائي

بلغت 10.4 %، 10.8 %± 0.08 ± 11.7, 0.51 ± 11.1, 0.7 ± %
وبالنسبة للماء وبنفس الترتيب كانت، 9.9 % ± 0.17 , 88.84 % ± 0.03 , 88.3 % ± 0.09.

رصحت فروقات معنوية بين متوسط النسبة المئوية للمواد الصلبة الكلية والماء لحليب صافيyo، سعودية، طازة ومستمعظم

في هذه الحالة وجد أن الحليب المعموم المنتج بواسطة صنع صافيyo ذو قيمة غذائية أعلى إذا وضع المواد الصلبة الكلية في الاعتبار.

تثير النتائج الوضوح إلى أن الحليب المعموم المنتج بواسطة الصانع السعودي ذو قيمة غذائية أعلى مقارنةً مع ذلك المنتج بواسطة الصانع السودانية.

تتعذر إشارة إلى أن تركيز العنصر المختلف بالحليب الخام إضافة إلى طرق التصنيع المختلفة (البسطة والتعقيم) هي التي تحدد القيمة الغذائية للحليب السائل المستهلك.

ختاماً قدمت توصيات محددة في هذا السياق.