

DEDICATION

This work is dedicated to my mother,
To the soul of my father
And to my family with love

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ABSTRACT

This investigation was carried out to evaluate the effect of packaging material (plastic & metal) on the quality of the Sudanese soft white cheese.

Cheese was made from cow's milk using the traditional method; 500 gm of cheese were packaged in each of 16 plastic and 16 metal packages. One half of the packages were stored at room temperature ($36 \pm 1^\circ \text{C}$) and the other half was stored at ($5 \pm 1^\circ \text{C}$). Cheese samples were analysed at zero time, then after 21, 42, 63 and 84 days of storage. Cheese was analysed for moisture, ash, fat, protein, lead content, acidity and pH. Microbial analysis for total bacterial viable count, coliform, *E.coli*, moulds and yeasts counts were carried out. Cheese samples were organoleptically evaluated for taste, flavour, colour, texture and overall acceptability.

Results showed significantly higher ($P < 0.05$) values for ash and fat content of cheese in metal packages stored at room temperature and at 5°C . Significantly higher ($P < 0.05$) values of moisture content and pH were obtained for cheese in plastic packages, while acidity and protein content were not significantly ($P > 0.05$) affected, compared to metal packages.

Regard less of packaging materials, storage temperature and period significantly ($P < 0.05$) affected the chemical composition of cheese. Cheese stored at room temperature had significantly higher ($P < 0.05$) fat, protein content and acidity, while lower values were obtained for ash, moisture content and pH ($P < 0.05$). Lead was detected in one sample of cheese in metal package after 84 days of storage at room temperature.

Results of microbial analysis showed significant difference ($P < 0.05$) in total bacterial viable count, coliform, *E.coli* and yeasts counts of cheese in different packaging materials. The highest values were in plastic packages stored at different temperatures, while there was not significantly difference ($P > 0.05$) in moulds count. The total bacterial viable count was significantly ($P < 0.05$) affected by storage temperature, the highest value was at room temperature. However, yeast, moulds, coliform and *E.coli* counts were not significantly ($P < 0.05$) affected. The total bacterial viable count, yeasts and moulds increased during storage period, while coliform and *E.coli* counts decreased.

Taste, flavour and overall acceptability of cheese were not significantly ($P > 0.05$) affected by the type of packaging material at the room temperature, yet was significantly ($P < 0.05$) affected at $5 \pm 1^\circ\text{C}$, where the lowest values were obtained in metal packages. The best flavour, taste and overall acceptability were at day 42 of storage. Texture and flavour of cheese did not show any significant differences ($P > 0.05$) in different types of packaging material. However, storage period significantly ($P < 0.05$) affected these attributes at room temperature, where the highest value were at day 42 of storage, while highest values for texture were at room temperature for.

بسم الله الرحمن الرحيم

خلاصة الاطروحة

اجري هذا البحث لدراسة تاثير عبوات الصفيح و البلاستيك على جودة الجبنة السودانية البيضاء الطرية.

صنعت الجبن البيضاء بالطريقة التقليدية من لبن ب قري و تمت تعبئتها في 16 عبوة من الصفيح و 16 عبوة بلاستيك (كل عبوة تحتوي 500 جم). تم تخزين نصف عبوات الصفيح و البلاستيك عند درجة حرارة 5 ± 1 م° و النصف الاخر خزن عند درجة حرارة الغرفة (36 ± 1 م°).

اجريت التحاليل للرطوبة والرماد و الدهن والبروتين والحموضة و ال pH والرصاص كما اجريت التحاليل المايكروبيولوجية لتقدير العد الكلي للبكتريا وبكتريا القولون وبكتريا القولون البرازية والخمائر والفطريات اضافة الى التقييم الحسي (اللون والنكهة والطعم والقوام والقبول العام) في اليوم الاول وبعد 21 و 42 و 63 و 84 يوم من التخزين.

اوضحت النتائج ان الجبنة المعبأة في عبوات من الصفيح عند درجة حرارة الغرفة ودرجة 5 ± 1 م° لها نسبة اعلى من الرماد ($P < 0.05$), والدهون ($P < 0.05$), فيما وجدت نسبة اقل للرطوبة ($P < 0.05$) و ($P < 0.05$) pH. اما الحموضة و البروتين لم يتأثرا معنويا وذلك مقارنة بعبوات البلاستيك.

اثرت درجة حرارة وفترة التخزين معنويا ($P < 0.05$) على التركيب الكيميائي حيث ان الجبنة التي تم تخزينها عند درجة حرارة الغرفة اُحتوت على نسبة اعلى من الدهن و البروتين و الحموضة ($P < 0.05$) بينما احتوى على نسب اقل من الرطوبة و الرماد و الرقم الهيدروجيني. وجد الرصاص في عبوة صفيح واحدة مخزنة عند درجة حرارة الغرفة بعد 84 يوم من التخزين.

اظهرت نتائج التحليل الميكروبي ان تعبأة الجبن في عبوات من الصفيح و البلاستيك له اثر معنوي ($P < 0.05$) على العدد الكلي للبكتريا و بكتريا القولون و بكتريا القولون البرازية و الخمائر. اعلى القيم كان في عبوات البلاستيك . بينما لم يكن هناك أثر معنوي على الاعفان . درجة حرارة التخزين كان لها اثر معنوي ($P < 0.05$) على العدد الكلي للبكتريا, اعلى القيم كانت عند درجة حرارة الغرفة. بينما لم يكن هناك أثر معنوي ($P > 0.05$) على الاعفان و الخمائر و بكتريا القولون و بكتريا البرازية. فترة التخزين كان لها اثر معنوي ($P < 0.05$) على العدد الكلي للبكتريا و بكتريا القولون و بكتريا القولون البرازية و الخمائر و الاعفان . حيث ازداد العدد الكلي للبكتريا و الخمائر و الاعفان مع الزمن بينما قلت اعداد بكتريا القولون و بكتريا القولون البرازية. الطعم و النكهه و القبول العام لم يتأثرا معنويا ($P > 0.05$) باختلاف العبوات عند درجة حرارة الغرفة بينما تأثرا معنويا ($P < 0.05$) عند درجة 5 ± 1 م حيث أقل قيم كانت في عبوات الصفيح. تأثر الطعم و النكهه و القبول العام بفترة التخزين حيث اعلى القيم كانت في اليوم 42. القوام و اللون لم يتأثرا معنويا ($P > 0.05$) باختلاف العبوات بينما تأثر معنويا ($P < 0.05$) بفترة التخزين عند درجة حرارة الغرفة حيث أقل قيم كانت في اليوم 42. أما القوام تأثر معنويا باختلاف درجة الحرارة حيث أعلى القيم كانت على درجة حرارة الغرفة.

