

DEDICATION

To soul of my father

To my mother

To my family and friends

To my dear brothers and sisters

With love and respect

ACKNOWLEDGEMENT

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ABSTRACT

This study was carried out at Khartoum state to evaluate the effect of packing materials on the chemical composition (Fat , Protein, Ash , Total solids , Titratable acidity ,Volatile fatty acids, Calcium, phosphorus and Potassium) and microbiology quality (Total Bacterial Count ,*Yeast* and *mould* , *coliforms* , *Escherichia coli* , *Staphylococcus aureus* ,*Salmonella* and *Listeria monocytogens* counts) of white, Romi and Mozzarella cheeses. A total of 300 samples (120 samples were taken randomly from each types of cheeses with different packing materials; 20 samples in plastic and 20 samples in paper pack), except for Mozzarella cheese only one package (plastic pack) was found , were collected from three different areas (Khartoum, Khartoum North and Omdurman). The manufacture date of the collected cheese samples was defined to be at fixed date. The samples were analyzed at the laboratory of Dairy Production Department, College of Animal Production at Khartoum University, during the period from November 2016 to December 2017. The data was subjected to statistical analysis by using SPSS programme with multivariate analysis. The results showed that the packaging materials had significant difference ($P < 0.01$) on the chemical composition of the white cheese, fat, crude protein, Total solids, titratable acidity , ash , Ca, P and K were high in plastic pack, while the (VFA) was low. The packaging materials and area were not significantly affected the total bacterial count of white cheese samples. High presence of *yeast*, *mold*, *Staphylococcus aurous* and *Coliforms* were found in white cheese samples in plastic pack, however, *Escherichia coli* was not detected in cheese samples. Packing materials showed significant variation ($P < 0.01$) in the chemical composition of Romi cheese. Fat, crude protein, total solids, VFA, ash, Ca contents was higher, while the titratable acidity, K and P contents were lower when packed in paper pack.

Different area was not significantly affected the chemical composition of Romi cheese, except fat, titratable acidity and ash, was significantly affected ($P > 0.05$) by the area. The packing materials and area were not significantly affected the total bacterial count of Romi cheese. High presence of yeast and molds were found in the Romi cheese samples in plastic package, while the high presence of *E. coli*, *Staphylococcus aureus* and *Coliforms* were found in Romi cheese samples in paper package. Area were significantly affected ($P < 0.01$) the total solids, volatile fatty acid and titratable acidity of Mozzarella cheese samples, however the fat, protein, ash, Ca, P and K contents were not significantly affected by the area. The area was not significantly affected the total bacterial count of Mozzarella cheese samples. *Yeast*, *mold*, *Staphylococcus aureus* and *coliforms* were found in Mozzarella cheese samples in plastic pack, hence *Escherichia coli* were not detected. *Salmonella* and *Listeria monocytogens* count were not detected in all cheese samples.

مستخلص البحث

إجريت هذه الدراسة في ولاية الخرطوم لتقييم تأثير العبوات على التركيب الكيميائي (الدهون، البروتين، الرماد، الجوامد الصلبة الكلية، الحموضة، الأحماض الدهنية المتطايرة، الكالسيوم، الفسفور والبوتاسيوم) والجودة الميكروبية (العدد الكلي للبكتيريا، الخمائر والفطريات، الكوليفورم (بكتريا القولون)، الإشريكية القولونية، المكورات العنقودية الذهبية، السالمونيلا والستريا) للجبنه البيضاء وجبنه الموزاريلا والجبن الرومي. تم جمع 300 عينة (120 عينة لكل من انواع الجبن فى عبوات مختلفة، 20 من العبوات بلاستيكية و 20 من العبوات الورقية) عدا جبنه الموزاريلا فقد توفر نوع واحد من العبوات البلاستيكية فقط، وتم جمعها من ثلاثة مناطق مختلفة (الخرطوم، الخرطوم بحرى وامدرمان) بتاريخ تصنيع معروف و ثابت تم اجراء التحليل للعينات فى قسم انتاج الالبان بكلية الانتاج الحيوانى جامعة الخرطوم اثناء الفترة ما بين نوفمبر 2016 الى ديسمبر 2017. وتم تحليل البيانات احصائيا باستخدام برنامج SPSS أشارت النتائج إلى أن العبوات المختلفة أظهرت تأثيراً معنوياً ($P < 0.01$) على التركيب الكيميائي للجبنه البيضاء. حيث ارتفع محتوى كل من الدهون، البروتين الخام، الجوامد الصلبة الكلية، الحموضة، الرماد، الكالسيوم، البوتاسيوم و الفسفور في حين انخفض محتوى الأحماض الدهنية الطيارة عندما كانت الجبنه البيضاء فى عبوات بلاستيكية. بينما لم يكن هنالك تأثيراً للعبوات المختلفة والمنطقة على العدد الكلي للبكتيريا فى الجبنه البيضاء. تم العثور على نسبة مرتفعة من الخمائر، الاعفان، المكورات العنقودية الذهبية والكوليفورم في عينات الجبنه البيضاء المعبأة فى عبوات بلاستيكية، حيث لم يتم العثور على الإشريكية القولونية فى عينات الجبنه البيضاء. ولوحظ اختلافاً معنوياً ($P < 0.01$) للجبنه الرومي بالنسبة لمواد التعبئة حيث ارتفعت نسبة الدهون، البروتين الخام، الجوامد الصلبة الكلية، والأحماض الدهنية الطيارة، الرماد، الكالسيوم بينما انخفضت الحموضة، البوتاسيوم والفسفور عندما كانت معبأة فى عبوات ورقية. المناطق المختلفة لم يكن لها تأثيراً معنوياً على التركيب الكيميائي لعينات الجبنه الرومي، باستثناء الدهن، الحموضة والرماد. لم يكن هنالك تأثيراً معنوياً للعبوات المختلفة والمنطقة على العدد الكلي للبكتيريا فى الجبنه الرومي. بينما تم العثور على نسبة عالية للخمائر والاعفان في عينات الجبنه الرومي المعبأة فى عبوات بلاستيكية. وارتفع عدد بكتريا القولون (الكوليفورم و الإشريكية القولونية) و المكورات العنقودية الذهبية فى عينات الجبنه المعبأة فى عبوات ورقية.

وجدت هنالك فروقا معنوية ($P < 0.05$) للمناطق المختلفة على عينات جبنه الموزاريلا المعبأة فى عبوات بلاستيكية بالنسبة للجوامد الصلبة الكلية والأحماض الدهنية الطيارة، في حين لم تكن هنالك فروقا معنوية

فى الدهن، البروتين الخام، الرماد ، الكالسيوم ، البوتاسيوم و الفسفور. لم يكن هنالك تأثيرا معنويا للمنطقة على العدد الكلى للبكتريا. تم العثور على الخمائر والاعفان والمكورات العنقودية الذهبية والكوليفورم بنسب مختلفة. وحيث لم يلاحظ وجود الاشريكية القولونية فى جينة الموزار يلا المعبأة فى عبوات بلاستيكية. لم يكن هنالك وجودا لبكتريا السالمونيلا ، و اللستريا فى جميع عينات الاجبان المختلفة.