Dedication

This work is dedicated to my Parents with Love and Respect

Acknowledgement

Thanks and Praise to my Almighty God for his wonderful blessings and mercy for giving me the health and strength to complete this work. I would like to express my appreciation and thanks to my supervisor Professor Omer Ibrahim Ahmed Hamid for his supervision, suggestions, guidance and valuable advices as well as his continuous assistance until this study was accomplished.
The encouragement of my colleagues at Upper Nile University, Sudan University of Science and Technology and Dr. John Garang Memorial University of Science and Technology is much appreciated. Many thanks are due to Amna Bahar, Hashem El-Hussein, Assia Ibrahim, Zawahir Abuelbasher, Madina Mustafa and Tahani Ahamed from the Department of Dairy Science and Technology for their endless help and support. Special thanks are extended to Imam and Najwa in the laboratory of microbiology.

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Finally My thanks and appreciation are extended to my parents, brothers, sisters, aunts, uncles, relatives, friends in laws, my Daughter Anak, my Son Manyang and to everyone who helped me specially my wife Adit William for her great help, love and patient day and night during the preparation of this study.

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Abstract

This study was carried out at the laboratory of Dairy Science and Technology Department, College of Animal Production Science and Technology at Sudan University of Science and Technology during the period from January to July 2013 to determine the effect of different levels of cassava powder on the physicochemical characteristics, microbiological quality, yield and sensory characteristics of the Sudanese white soft cheese during storage. One hundred and twenty liters (120 liters) of fresh cow's full cream milk was used for the production of a Sudanese white soft cheese with different levels of cassava powder (Control, 0.5, 0.75 and 1 % respectively). The milk was pasteurized at 72°C for 1 minute and then manufactured into a Sudanese white soft cheese and stored at room temperature for 90 days and examined for the physicochemical, microbiological and organoleptic quality at day 0, 30, 60 and 90 intervals.

The results indicated that total solids contents decreased significantly (P<0.05) with increasing levels of cassava powder, while fat, crude protein, acidity and volatile fatty acid increased significantly (P<0.05) with the levels of cassava powder. There were no significant effect (P>0.05) of cassava powder on pH and ash contents of the Sudanese white soft cheese during storage.
white soft cheese. The pH decreased with the levels of cassava powder, while ash increased. Vitamin C, calcium and phosphorus increased significantly (P<0.05) with the levels of cassava, while there were no significance effect on sodium and potassium.

There were significance effect (P<0.05) by the levels of cassava on total bacteria count, lactobacilli, streptococci, yeasts and moulds and Staphylococcus aureus, while there was no significance effect on coliforms. The total bacteria count and coliforms increased with the levels of cassava, while lactobacilli, streptococci, yeasts and moulds and Staphylococcus aureus were decreased.

The yield of the Sudanese white soft cheese was affected by the addition of different levels of cassava powder to milk. The yield increased with the addition of cassava powder. The yield of the cheese made from milk with 1 % cassava was the highest (17.78 %) while the lowest one was recorded by the cheese made from milk without cassava (15.93 %).

The organoleptic quality of cheese revealed that there were significance effect (P<0.05) of cassava powder on color, texture and saltiness, while there were no significance effect on flavor, taste and over all acceptability. The results also indicated that there were significant effect (P<0.05) of the storage period on total solids, fat, protein, titratable acidity, pH and volatile fatty acids, while there was no significant variations on the ash content. Total solids, titratable acidity, volatile fatty acid increased with the storage period, while fat, crude protein and pH decreased. Vitamin C, calcium, phosphorus sodium and potassium decreased significantly (P<0.05) with storage period.

The total bacteria count increased significantly (P<0.05) with the storage period up to day 60 and then decreased, while lactobacilli, streptococci, coliforms and Staphylococcus aureus were significantly (P<0.05) decreased with the storage period from the beginning up to the end. Yeasts and moulds significantly (P<0.05) increased with the storage period from day 0 up to day 90.

All the sensory characteristics of the white cheese were significantly (P<0.05) affected by the storage period. Results showed that the best values for color, flavor, texture, taste and over all acceptability were obtained at the first day (day zero) of the storage period, while the highest value for the saltiness was recorded at the day 30. The color of the cheese decreased from the day zero up to the end of the storage (day 90). The flavor scores reduced from the day zero up to day 60 and then increased.
again at the day 90 of the storage. The lowest value for texture and taste were recorded at the day 30 of the storage. The saltiness increased at the day 30 and then decreased again up to the end of the storage period. The over all acceptability reduced by the storage period from day zero up to the day 60 and then increased again at the day 90. The best over all acceptability was recorded at day zero, while the lowest one was at the day 30.

ملخص البحث

أجريت هذه الدراسة بعمل تكنولوجيا الآلابان بكلية علوم وتكنولوجيا الإنتاج الحيواني بجامعة السودان للعلوم والتكنولوجيا في الفترة من يناير إلى يوليو 2013 بهدف تقييم تأثير المستويات المختلفة من بدرة الكسافة على الصفات الفيزيوكيميائية، الجودة المايكروبايولوجية، الإنتاجية والتقييم الحسي للجبن السوداني البيضاء الطريقة أثناء فترة التخزين. في هذه التجربة تم استخدام مائة لترة (120 لتر) من لبن البقر الكامل الدسم. أجريت أربعة معاملات، المعاملة الأولى صنعت فيها الجبنة دون إضافة بدرة الكسافة، في المعاملات الثانية والثالثة والرابعة استخدمت هذه المستويات من بدرة الكسافة 0.5 %، 0.75 % و 1 % (الي التوالي لكل من المعاملات الثلاث). تم بسترة اللبن لدرجة حرارة 72 درجة مئوية لمدة دقيقة وبرد لدرجة حرارة 42 درجة مئوية ومن ثم أضيفت بادئ الزبادي بنسبة 1% إضافة حبوب النجفة (حبة لكل 50 لتر) عند درجة حرارة 40 درجة مئوية وصحتي اللبن إلى جبن بيضاء وخزنت العينات في درجة حرارة الغرفة لمدة 90 يوماً وتم إجراء التحاليل في اليوم (0، 30، 60 و 90).

بالإضافة إلى المستويات (0.05) أظهرت الدراسة بأن الجوادات الكلية تتأثر معنىً كل من الدهون، البروتينات (P<0.05) المختلفة من بدرة الكسافة، بينما تزايدت معنوية الحامض، و الأحماض الدهنية الطيارة. لم يتأثر كل من الأس الهيدروجيني والرماد بمستويات مختلفة من بدرة الكسافة حيث تناقص الأس الهيدروجيني بينما زادت نسبة الهمولز بزيادة نسب بدرةلكسافة (5 مستويات من 4.53 إلى 5.53 في الجبن المصنعة دون إضافة بدرة الكسافة لتبلغ 8.46±0.8 في الجبن المصنعة من 1% كاسفا).

بمستوي (0.05) زادت قيم كل من فيتامين ج، كالسيوم، و الفسفر بصورة معنوية بدرة الكسافة بينما لم يتأثر معدناً كل من الصوديوم والبوتاسيوم.
لمستويات الكسافا المختلفة على كل من العدد الكلي (P<0.05) كانت هناك تأثير معنوي للبكتيريا، بكتيريا حامض اللاكتيك، الخمائر والفطريات والكورات الذهبية. بينما لم تتأثر البكتيريا القولونية بمستويات الكسافا. زاد العدد الكلي للبكتيريا والبكتيريا القولونية بزيادة مستويات الكسافا بينما تناقصت كل من اللاكتوباسليا، الإستربينوكوكايات، الخمائر والفطريات والكورات الذهبية بمستويات الكسافا.

تأثرت أنتاجية الجبن بالنسب المختلفة للكسافا حيث تزايدت الإنتاجية بزيادة نسب بدرة الكسافا حيث سجلت الجبن المصنوع من اللبن المضاف إليها نسبة (1%) من بدرة الكسافا أعلى إنتاجية (17.8%) بينما سجلت الجبن المصنوع من لبن بدون بدرة الكسافا أقل إنتاجية (15.93%).

على كل من اللون، القوام (P<0.05) أثرت النسب المختلفة من بدرة الكسافا معنويًا والملوحة بينما لم تتأثر الرائحة،طعم وقبول العام. سجلت الجبن المصنوع من اللبن الغير مضاف إليها بدرة الكسافا أعلى القيم بالنسبة لللون، القوام،طعم وقبول العام بينما سجلت الجبن المصنوع من (0.5%) أعلى القيم لكل من الرائحة،الملوحة.

أظهرت الدراسة كذلك بأن فترات التخزين أثرت معنويًا على كل من المواد (P<0.05) والملوحة. ارتفعت صلبة الكلية، الدهن، البروتين، الحموضة، رقم الأس الهيدروجيني والأحماض الدهنية الطيارة بينما لم تتأثر الرماد. زاد كل من المواد الصلبة الكلية، الحموضة والأحماض الدهنية الطيارة بتقدم فترة التخزين بينما تناقص الدهن، البروتين، الدهن، الأملاح، الدهن، والمغذيات الدقيقة بمرور الوقت. كل من فتامين ج، الكالسيوم، (P<0.05) بتقدم فترة التخزين تناقصت بصورة معنوية. الفسفر، الصوديوم، والبوتاسيوم.

بتقدم فترة التخزين حتى اليوم 60 من ثم (P<0.05) تزايد العدد الكلي للبكتيريا معنويًا. كل من اللاكتوباسليا (P<0.05) تتناقص بصورة معنوية الإستربينوكوكايات، واتشيربا القولونية والبكتيريا النعوية الذهبية من اليوم الأول بتقدم فترة (P<0.05) وحتى نهاية فترة التخزين. تزايدت الخمائر والفطريات معنويًا.

بتقدم فترة التخزين. أظهرت (P<0.05) تأثير كل الخواص الحسية للجبن معنويًا. النتائج بأن أفضل القيم لللون، الرائحة،طعم، القوام،طعم والقبول العام تم تسجيلها في

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اليوم الأول من التخزين، بينما أعلى القيم للملوحة قد تم تسجيلها في اليوم 30 من فترة تخزين.