

الآية  
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(وَمَا خَلَقْنَا السَّمَاءَ وَالْأَرْضَ وَمَا بَيْنَهُمَا لَاعِبِينَ) الانبياء (16)

صدق الله العظيم

**Dedication**

**To my father**

**Mother**

**Brothers and sisters**

**With love**

## **Acknowledgements**

First, almost grateful thanks to Allah for all has giving me to complete this work.

I wish to express my special appreciation and gratitude to my supervisor Prof. Omer Ibrahim Ahmed for his helpful supervision and proper guidance grateful thanks for his patience, advices and encouragement to carry out this work.

My thanks are extended to my Family for their assistance during the study.

Special thanks are due to all my friends for their assistance and encouragement.

## List of Contents

<b>Content</b>	<b>Page No</b>
الآية	I
Dedication	II
Acknowledgement	III
List of contents	IV
List of tables	X
Abstract	XI
Arabic abstract	XII
<b>Chapter One</b>	
1. Introduction	1
<b>Chapter Two</b>	
2. Literature Review	3
2.1 Milk	3
2.2 Fermented milk products	4
2.2.1 Cultures of fermented milk	5
2.2.2 Cultured butter milk	5
2.2.3 Sour cultured cream	5
2.3 Culture milk	6

2.4 Scandinavian fermented milk	7
2.4.1 Viili	7
2.4.2 Ymer	7
2.4.3 Skyr	8
2.5 Russian and Eastern European fermented milk	8
2.5.1 Kefir	8
2.5.2 Koumiss	9
2.6 Middle East fermented milk	9
2.6.1 Laban rayeb or Roub	9
2.6.2 Kishk	10
2.6.3 Labneh	10
2.6.4 Zabady	10
2.7 South Asian fermented milk	11
2.7.1 Dahi	11
2.7.2 Shrikhand	11
2.8 Yoghurt	12
2.8.1 Types of yoghurt	13
2.8.2 Factors affecting the physical and sensory properties of yoghurt	13
2.8.2.1 Dry matter fortification	13

2.8.2.2 Heat treatment	14
2.8.2.3 Incubation temperature	15
2.8.2.4 Starter culture	15
2.9 Health benefits of yoghurt	16
2.10 Storage of yoghurt	17
2.11 Yoghurt microbiology	17
2.12. <i>Lactobacillus acidophilus</i>	18
2.13. <i>Lactobacillus plantarum</i>	19
2.13.1. Metabolism	19
2.13.2. Therapeutics	20
2.14. Packaging materials	20
2.15. Probiotics	21
<b>Chapter Three</b>	
3. Material and methods	22
3.1 Materials	22
3.2 Adjunct Starter culture preparation	22
3.3 The starter culture	22
3.4 Methods	22
3.4.1 Yoghurt making process	22

3.4.2 Chemical Analysis	23
3.4.2.1 Fat content	23
3.4.2.2 Protein contents	23
3.4.2.3 Total solids (T.S) content	24
3.4.2.4 Ash content	24
3.4.3 Sensory evaluation	25
3.4.4 Statistical analysis	25
<b>Chapter Four</b>	
4. Results	26
4.1 Effect of different levels of adjunct starter culture on the chemical characteristics of set yoghurt	26
4.2 Effect of storage period on the chemical characteristics of set yoghurt	28
4.3 Effect of storage period and levels of adjunct starter cultures on chemical composition of yoghurt	30
4.4 Effect of adjunct starter culture on the sensory characteristic of set yoghurt	36
4.5 Effect of storage period on the sensory characteristics of set yoghurt	38
<b>Chapter Five</b>	
5. Discussion	40

<b>Chapter Six</b>	
Conclusions and Recommendations	44
6.1 Conclusion	44
6.2 Recommendations	44
References	45
Appendix	54



### List of Table

<b>Subject</b>	<b>Page No</b>
Table ( 1) Effect of different levels of starter cultures on chemical composition of set yoghurt.	27
Table(2) Effect of the storage period on the chemical composition of set yoghurt.	29
Table (3): Effect of the storage period and different levels of adjunct starter cultures on the fat content (%) of yoghurt.	31
Table ( 4) Effect of storage period and different levels of adjunct starter cultures on the acidity (%) of yoghurt	32
Table ( 5) Effect of storage period and different levels of adjunct starter cultures on total solids of yoghurt.	33
Table ( 6): Effect of storage period and different levels of adjunct starter cultures of yoghurt on ash content (%) of set yoghurt.	34
Table (7): Effect of the storage period and different levels of adjunct starter cultures on protein contents of set yoghurt.	35
Table (8) Effect of the different levels of adjunct starter cultures on sensory evaluation of set yoghurt	37

Table (9): ): Effect of the storage period on the sensory characteristics of set yoghurt	39
--	----

## ABSTRACT

This study was conducted at the Department of Dairy Science and Technology, College of Animal Production Science and Technology, Sudan University of Science and Technology to evaluate the effect of adding different levels of Adjunct culture and storage period to conventional yoghurt culture. Eight liters of fresh cows milk were purchased from dairy farm, college of Animal Production Science and Technology. The milk was pasteurized at 90°C/30min then cooled to 45 °C. The pasteurized milk divided into four equal portions. Four treatments were carried out. The first treatment was the control sample in which set yoghurt was from conventional yoghurt starter culture. In the second, third and fourth treatments 50%, 75% and 100% of adjunct starter culture (*Lactobacillus acidophilus* and *Lactobacillus plantarum*) were added respectively. The inoculated milk was incubated in all treatments at 43 °C for three hours. After complete coagulation the yoghurt samples were cooled in refrigeration with temperature (4°C). Chemical composition and sensory evaluation were carried out for the yoghurt samples in all treatments at intervals of 1, 5 and 10 days. The results indicated that significant variations ( $P < 0.05$ ) were observed in the fat%, acidity% and protein % while total solids and the ash % showed no significant difference ( $P > 0.05$ ) due to the adjunct starter cultures addition. However, the storage period had significant difference ( $P < 0.05$ ) on the fat, protein, total solids and acidity while the ash content did not affected by storage period. The sensory characteristics of the yoghurt samples found to be not affected significantly ( $P > 0.05$ ) by the storage period except the texture and overall acceptability. Addition of starter cultures had significant variations on

the colour, flavor, texture, taste and overall acceptability. The results revealed that the treatments with 50% and 75% showed higher sensory scores.

## مستخلص البحث

أجريت هذه الدراسة لتقييم تأثير إضافة مستويات مختلفة من المدعمات الحيويه ( *L.plantarum* , *L.acidophilus* ) للين المبستر وكذلك فترة التخزين على جودة الذبادي الجامد المصنع . وقد تم شراء اللبن من مزرعة الألبان بكلية علوم وتكنولوجيا الانتاج الحيواني . حيث تم جمع 8 لتر من لبن الأبقار الخام وتمت بسترته في درجة حراره/°C 90 لمدة 3 دقائق ثم قسم الي 4 مستويات متساوية . وتمت إضافة بادئ الزبادي بنسبة 2% من كمية اللبن المبستر بعد تبريده الي 45° مئوية . حيث تم تعيين الضابط ( الذي أضفنا إليه بادئ الذبادي التجاري ) ومن ثم تمت إضافة 50% ، 75% ، 100% من البادئ الحيوي في كل من المعاملة الثانية والثالثة والرابعة على التوالي.تم تحضين المعاملات في الحضان في درجة حرارة 43° مئوية لمدة 3 ساعات . ثم تم حفظ العينات في الثلاجة في درجة حرارة 4° مئوية لمدة 10 أيام . ثم أجري التحليل الكيميائي والتقييم الحسي للعينات في اليوم الأول والخامس والعاشر .

أجري التحليل الإحصائي للبيانات باستخدام برنامج الحزم الاحصائية SPSS . وأظهرت النتائج أن لفترة التخزين والمعاملات أثر معنوي كبير على التحليل الكيميائي للعينات ( $P<0.01$ ) . حيث وجدت فروق معنويه لاثر المعاملات على الدهون والحموضه والبروتين ( $P<0.05$ ) ، بينما لم توجد فروق معنويه للمواد الصلبه الكليه والرماد ( $P>0.05$ ) . بينما كان لفترة التخزين أثر معنوي ( $P<0.05$ ) على الدهون والبروتين والمواد الصلبه الكليه والحموضه، بينما لم يتأثر الرماد بفترة التخزين .

وأوضحت النتائج أن ليس لفترة التخزين أي أثر معنوي على التقييم الحسي للعينات من حيث اللون والنكهة والطعم ، بينما وجد أثر معنوي على القوام والقبول العام ( $P<0.05$ ) بينما كان للمعاملات أثر معنوي على التقييم الحسي للعينات ( $P<0.01$ ) من حيث اللون والنكهة والقوام والطعم والقبول العام . كما أظهرت النتائج أن العينات التي بها المعاملات 50% و75% على التوالي جيدة جداً من حيث التقييم الحسي.