



**Kafrelsheikh University
Faculty of Agriculture
Dairy Department**

A STUDY ON CREAM CHEESE

BY

Ahmed Gamal Elshenawy Elshenawy

**B.Sc. Agric. (Dairying)
Fac. Agric., Al-Azhar University, 2012**

THESIS

**Submitted in Partial Fulfillment of
The Requirements**

For

The Degree of

Master of Science

In

Agricultural Sciences

(Dairying)

To

Dairy Department

Faculty of Agriculture

Kafr EL Sheikh University

2021

CONTENTS

Title	Page
INTRODUCTION	1
REVIEW OF LITERATURE	5
1- Cream cheese: Definition and classification	5
2- Cream cheese: Processing composition and some properties	7
3- The use of fat replacers in cheesemaking	16
4- Storage of cream cheese	20
MATERIALS AND METHODS	22
Milk	22
Starter cultures	22
Modified starch	22
Chemical analysis of milk	23
Manufacture of cream cheese	23
Chemical analysis of the cheese samples	23
Moisture content	23
Fat	23
Total nitrogen (TN)	23
Carbohydrate content	23
Ash content	23
Titrateable acidity	24
pH values	24
Energy content	24
Spreadability	24
Extraction of cheese fat	24
Acid value	25
Thiobarbituric acid number (TBA)	25
Total volatile fatty acids	25

Microbiological analysis	26
Total bacterial count (TBC)	26
Yeasts and moulds	26
Coliform count	26
Sensory evaluation	26
Statistical analysis	26
RESULTS AND DISCUSSION	27
Part I: The use of modified starch as a fat replacer in making cream cheese and cheese analogues	27
Section (A): Analysis of single cream cheese (SCC) and its analogues	29
Moisture content	29
Fat content	33
Fat / dry matter (FDM)	37
Protein content	40
Carbohydrate content	43
Ash content	46
Acidity values	49
pH values	52
Caloric values	55
Spreadability values	58
The organoleptic properties	62
Section (B): Analysis of double cream cheese (DCC) and its analogues	67
Moisture content	67
Fat content	70
Fat / dry matter (FDM)	73
Protein content	76
Carbohydrate content	79

Ash content	82
Acidity values	85
pH values	88
Caloric values	91
Spreadability values	94
Organoleptic properties	98
GENERAL DISCUSSION	103
Part II: Effect of method of packing on the quality and shelf life of cream cheese	109
Section (A): Analysis of single cream cheese (SCC)	111
Moisture content	111
Fat content	114
Fat / dry matter (FDM)	117
Protein content	120
Ash content	123
Carbohydrate content	126
Acidity values	129
pH values	132
Spreadability values	135
Acid value	140
Thiobarbituric acid values	143
Total volatile fatty acid (TVFA)	146
Microbiological analysis	149
The organoleptic properties	152
Section (B): Analysis of double cream cheese (DCC)	158
Moisture content	158
Fat content	161

Fat / dry matter (FDM)	164
Protein content	167
Ash content	170
Carbohydrate content	173
Acidity values	176
pH values	179
Spreadability values	182
Acid value	186
Thiobarbituric acid values	189
Total volatile fatty acid (TVFA)	192
Microbiological analysis	195
The organoleptic properties	198
GENERAL DISCUSSION	203
SUMMARY AND CONCLUSION	212
REFERENCES	217
ARABIC SUMMARY	1 - 5

SUMMARY AND CONCLUSION

SUMMARY AND CONCLUSION

Part I: THE USE OF MODIFIED STARCH AS A FAT REPLACER IN MAKING CREAM CHEESE

Replacement of milk fat partially or fully with modified starch (MS) in making single cream cheese (SCC) and double cream cheese (DCC) caused the following in fresh and stored cheese of 10 days old, whereas the recorded values were for 0.0 and 100% replacement.

- 1- Increase in moisture content ($P \leq 0.05$) in fresh SCC from 60.98 to 71.29% and in stored cheese from 60.10 to 70.87%. The same was noticed in DCC with insignificant increase in fresh cheese.
- 2- Decrease in fat content (%) in fresh SCC from 14 to 0.4 and in stored cheese from 14.1 to 0.5 while the corresponding values in DCC were 32.0, 0.4, 32.5 and 0.5% and also decrease in the calculated fat on dry matter basis of all treated cheese samples ($P \leq 0.05$). The same was noticed in DCC.
- 3- Decrease ($P \leq 0.05$) in protein content (%) from 12.10 to 1.60 in fresh SCC and from 11.36 to 1.37 in stored cheese. This was accompanied by decrease of ash content in most cases and increase ($P \leq 0.05$) in carbohydrate content (%) from 10.11 to 24.02 in fresh cheese and from 11.53 to 24.44 in stored cheese. The same was noticed in DCC since a gradual increase in carbohydrate from 1.25 to 33.41% ($P \leq 0.05$) was recorded for fresh DCC.
- 4- An increase in acidity and decrease in pH were recorded due to the use of MS and the same was noticed due to storage of all cheese samples. This was true also in DCC. In fresh SCC, the acidity was 0.80% and significantly increased to 1.25%, whereas the corresponding values for

SUMMARY AND CONCLUSION

stored cheese were 1.0 and 1.40% respectively. The corresponding pH values were 4.74, 4.53, 4.66 and 4.29 in order.

- 5- Decrease in the calculated energy of the prepared cheese reaching about 50% decrease in case of using MS at level of 100% replacement. The caloric value (kJ/100g) was 895.34 in fresh control SCC, while the value was 447.33 in ($P \leq 0.05$) case of 100% replacement. The recorded corresponding values in stored SCC were 910.32 and 454.18 respectively. Such decrease was significant ($P \leq 0.05$) and was also noticed in DCC.
- 6- The control and the treated DCC had much higher values for spreadability than those of the SCC in fresh and stored cases, while MS decreased ($P \leq 0.05$) the values in DCC in case of 100% replacement. In SCC and DCC, the recorded values at the end of the test (30 min) were much higher than those after 6 minutes of the beginning of the test.
- 7- The prepared control SCC had less scores for general appearance and body & texture but concerning flavor, the MS - treated samples up to 75% replacement had higher scores than the control and this was true in the fresh and stored samples. In DCC, the maximum scores for all the evaluated sensorial properties were recorded at 50% replacement.

In conclusion, the prepared SCC or DCC and their analogues of 50% and 75% replacement in order or more were acceptable from the judges since their sensorial properties were good.

SUMMARY AND CONCLUSION

Part II: EFFECT OF METHOD OF PACKING ON THE QUALITY AND SHELF LIFE OF CREAM CHEESE

Cold - packing and hot – packing (70 and 80°C/ 1min) were applied on cream cheese and such treatments caused the following on composition and quality of single (SCC) and double (DCC) cream cheese:

- 1- Decreased moisture content of SCC from 61.78 to 61.18% for cold packing at 2 weeks of storage and in hot packed cheese from 61.35 to 59.23% and from 61.26 to 59.18% at 8 weeks of storage when cheese was packed at 70°C/1min and 80°C/1min respectively. The corresponding values for DCC were from 57.58 to 56.96% for cold packing and were in hot packing from 57.15 to 55.26% and from 56.93 to 55.06% in case of 70°C/1min and 80°C/1min respectively.
- 2- Increased fat content of SCC from 14.00 to 14.2% for cold packing at 2 weeks of storage and in hot packed cheese from 14.1 to 14.50% and from 14.1 to 14.51% at 8 weeks of storage due to 70°C/1min and 80°C/1min respectively. The corresponding values in DCC were from 31.58 to 32.08% for cold packing and in hot packed cheese were from 31.83 to 32.61% and from 31.90 to 32.65% due to applying 70°C/1min and 80°C/1min respectively.
- 3- Decreased fat/dry matter content of SCC and DCC due to the applied treatments which had insignificant impact on FDM values.
- 4- Decreased protein content ($P \leq 0.05$) of SCC from 12 to 11.50% in cold pack cheese at 2 weeks of storage and in hot packing from 12.05 to 11.30% and from 12.10 to 11.40% at 8 weeks of storage due to

SUMMARY AND CONCLUSION

70°C/1min and 80°C/1min respectively. This was true ($P \leq 0.05$) in DCC.

- 5- Increased ash content ($P > 0.05$) of SCC but in DCC the increase was significant in hot - packed cheese.
- 6- Increased significantly carbohydrate content of SCC from 9.57 to 10.35% for cold packing at 2 weeks of storage and in hot packed cheese from 9.82 to 11.89% and from 9.82 to 11.92% at 8 weeks due to 70°C/1min and 80°C/1min respectively. This significant increase was recorded in hot - packed cheese since the corresponding values were from 1.93 to 2.03% for cold packing and in hot packed cheese were from 2.01 to 3.14% and from 2.07 to 3.20% at 8 weeks of storage due to 70°C/1min and 80°C/1min respectively.
- 7- Increased significantly acidity content of SCC from 0.80 to 0.94% for cold packing and in hot packed cheese the values were from 0.75 to 1.23% and from 0.73 to 1.20% due to 70°C/1min and 80°C/1min respectively and during cold storage of cheese. In DCC the same finding was recorded.
- 8- Decreased pH value of SCC and DCC following an opposite trend prementioned of acidity.
- 9- Spreadability (after 6 min) increased in SCC from 1 to 3mm for cold packing at 2 weeks of storage and in hot packed cheese from 2 to 10mm and from 2 to 11mm at 8 weeks due to 70°C/1min and 80°C/1min respectively. Spreadability (after 6 min) increased in DCC from 8 to 10mm for cold packing at 2 weeks of storage and in hot packed cheese from 10 to 14mm and from 11 to 15mm at 8 weeks due to 70°C/1min

SUMMARY AND CONCLUSION

and 80°C/1min respectively. Much higher values were recorded when the test was continued for 30 minutes.

- 10-** Acid value was significantly increased during storage of SCC and DCC and the minimum values were recorded in most cheese samples of 80°C/1 min.
- 11-** Thiobarbituric acid values (TBA) followed the same trend of acid value, whereas cold - packed cheese samples had the lowest values as compared with those of hot - packed cheese samples.
- 12-** Total volatile fatty acid (TVFA) of SCC and DCC significantly increased during storage. No significant impact was noticed for packing treatments on TVFA of SCC. In DCC, degree of heat treatments of 70 and 80°C had insignificant effect on TVFA.
- 13-** Total bacterial count (TBC) as log CFU/g of SCC increased from 4.70 to 5.31 for cold packing at 2 weeks of storage and in hot packed cheese from 4.20 to 5.08 and from 4.14 to 5.01 at 8 weeks of storage due to 70°C/1min and 80°C/1min respectively. Such increase was significant. In DCC the counts increased from 4.81 to 5.36 for cold packing ($P > 0.05$) at 2 weeks and in hot pack cheese from 4.44 to 5.16 and from 4.26 to 5.13 at 8 weeks ($P \leq 0.05$) due to 70°C/1min and 80°C/1min respectively. No yeasts and moulds and coliform were detected in cheese samples.
- 14-** Organoleptically, the cold - packed cheese was accepted up to 2 weeks of cold storage only, whereas in hot - filling treatments the SCC and DCC were good inspite of a gradual decreases in the scoring points were recorded for general appearance, body & texture and flavour of cheese.