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LIST OF ABBREVIATIONS

WHO	World Health Organization
AOAC	Association of Official Analytical Chemist
FDA	Food and Drug Administration
pH	Hydrogen ion concentration
ml	Millilitre
EOSQ	Egyptian Organization for Standardization and Quality Control
Min	Minute
C	Control samples
FAO	Food and Agricultural Organization
TA	Titratable Acidity
B	*Bifidobacterium bifidum*
S. aureus	*Staphylococcus aureus*
E. coli	*Escherichia coli*
MRS	De Man Rogosa Sharpe media
LF	Lactoferrin
Lz	Lysozyme
SPSS	Statistical Package For the Social Sciences (soft package used for statistical analysis by IBM)

SUMMARY

This study was undertaken to investigate the effect of lactoferrin, lysozyme and bifidobacterium on the quality of soft cheese as a natural antimicrobials. The manufactured cheese divided in to 6 groups; Control (C), cheese added with lactoferrin (LF), cheese added with lysozyme (Lz), cheese containing bifidobacterium (B) , cheese containing bifidobacterium and lactoferrin (B+ LF) and finally cheese containing bifidobacterium and lysozyme (B+Lz). Organoleptic and microbiological examinations as well as acidy indices were carried out periodically at zerotime, 8th, 15th, 17th, 21th, 25th, 29th, 33th and 34 days of storage at 7 °C. The results indicated that

Organoleptic evaluation:

The total scores were high in the first week of storage and then decreased gradually till end of storage in all examined cheese samples.

The results revealed that the highest mean overall organoleptic scores values was cheese samples treated with Lz + B then Lz, B, C, B+LF and finally LF treated cheese sample.The control samples and B treated samples spoiled at 25th days of storage, while Lz and LF + B treated samples spoiled at 29th days of storage. The LF treated samples still accepted till 33 days of storage and spoiled at 34 days of storage.

Sanitary and Chemical examination:
pH value:

At zero day there was high in pH value as a result of using the ultrafiltrated milk. The mean value of pH for LF and Lz treated samples from zero to end of shelf life were between 6.83 to 6.23 and 6.83 to 6.58; respectively. The pH value was not decreased sharply along the storage

periods. This is may due to the antimicrobial action of lactoferrin and lysozyme. While, the mean values of pH for B treated samples groups (B, B+LF and B+ Lz) from zero day till end of shelf life (6.68±0.02- 5.3±0.02: 6.65±0.02- 5.3±0.02: 6.62±0.02- 5.42±0.02) ; respectively. The pH values decreased sharply along the storage periods. This is may due to the probiotic LAB Bifidobacterium action on soft cheese.

Titratable acidity:

The mean values of LF and Lz treated samples for T.A were between 0.05 to 0.11 and 0.05 to 0.09 %; respectively, along storage period. The T.A value was not increased sharply along the storage periods. This is may due to the antimicrobial action of LF and Lz. On the other hand, the mean values of B treated samples groups (B, B+LF and B+Lz) for T.A from zero day till end of shelf life were (0.23±0.002 - 0.90±0.002:0.19±0.002-0.90±0.002:   0.166±0.002-0.79±0.002) respectively. The T.A values increased sharply along the storage periods due to bifidobacterium action on soft cheese.

Moisture contents:

The mean values of moisture % of C, LF and Lz treated samples from zero day to the end of shelf life were 56.90±0.5 to 56.66±0.5, 56.9±0.3 to 57.7 ±0.1and 56.9±0.4 to 57.40±0.2 %; respectivelly. There were slightly increase in moisture % along period of storage shelf life.

On the other hand,the mean values of moisture % from the beginning of storage to the end of shelf life of B groups treated samples (B, B+LF, B+Lz) were between 58.05±0.2 % to 57.45±0.2%, 57.48±0.2 % to 57.00±0.2 and 57.78±0.1 to 57.6±0.1% respectively. There were slightly decrease in moisture % along period of storage shelf life. These

results indicated that there were a significance difference between C samples and B treated samples groups due to the development of acidity, which leads to curd contraction that helps to expel the whey from the curd in the B treated samples groups corresponding to control one due to the action of probiotic lactic acid bifidobacterium.

Thiobarbituric acid:

Generally the mean values of cheese samples from zero days to the end of storage periods were ((0.06±0.002- 0.12±0.002), (0.05±0.002-0.15±0.002), (0.06±0.002 - 0.15±0.002), (0.09±0.002 - 0.17±0.002), (0.10±0.00 - 0.22±0.00), (0.10±0.002- 0.16±0.002) mg malalonaldehyde/ kg) for the C, LF, Lz, B, B+ LF, B+Lz treated samples; respectively. This indicated that all treated cheese samples with control one did not exposed to oxidation and subsequently the results of samples were low. These were due to the tightely closing of the manufactured cheese samples.

Microbiological examination:

Bifidobacterium count:

Regardling to bifidobacterium,the mean value of bifidobacterium count ($\log_{10}$cfu/g ± SD) from zero day till end of shelf life were 7.54±0.01 to 9.48±0.05. The count increased gradually and significantly from the beginning of the storage till the end of shelf life.

In addition,the mean value of bifidobacterium count ($\log_{10}$cfu/g ± SD) at zero, 8th, 15th, 17th and 21th, 25th and 29th days of storage for the B+LF treated samples were 7.57±0.01, 8.92±0.01, 9.74±0.01, 9.83±0.01, 9.86±0.01, 9.91±0.01 and 8.51±0.01;   respectively. The count increased gradually and significantly from the beginning of the storage till the 25th days of storage and at 29th days of storage, it decreased one log, also there are a significance difference between B+ LF treated samples with B

treated ones, the counts in the B+LF treated sample were higher slightly than B treated one.

While, the mean value of Bifidobacterium count ($\log_{10}$cfu/g $\pm$ SD) at zero, 8th, 15th, 17th, 21th and 25th days of storage for the B+Lz treated samples were 7.20±0.03, 8.90±0.01, 8.48±0.03, 8.83±0.01, 8.32±0.04, 7.89±0.01; respectively. The count increased gradually and significantly one log at 8 days of storage and it stable at 8 log till 21th days of storage, at 25 days of storage the count decreased one log to be 7 log. Moreover, the count were significantly different from the count of C treated samples, the count of B+ Lz treated samples started to decreased than the C and B+LF treated samples at 15 days of storage till the end. On the other hand, even though the bifidobacterium had no distinct effect on microbials count, the cheese with bifidobacterium groups may used as a functional food with many therapeutic and health effect.

Yeast count:

In the first week of storage (zero- 8 days) there was no growth of yeast in all examined treated samples in all groups. While, at 15th days of storage the mean values of yeast count ($\log_{10}$cfu/g $\pm$ SD) for C, B, B+LF treated samples were 1.95±0.0, 1.85±0.06, 1.48±0.15 ; respectively. While, there were no growth of yeast appeared in LF, Lz and B+ Lz. This indicated the highly effect of LF and Lz on the yeast. At 17th days of storage the mean values of yeast count ($\log_{10}$cfu/g $\pm$ SD) for C, B, B+LF and B+Lz treated samples were 2.46±0.01, 2.38±0.02, 1.95±0.0, 1.90±0.05; respectively. While, there were no growth of yeast appeared in LF and Lz treated samples.

At 21 days of storage the mean values of yeast count ($\log_{10}$cfu/g $\pm$ SD) for C, LF, Lz, B, B+LF and B+Lz treated samples were 2.56±0.01, 1±0.0, 1±0.0, 2.54±0.01, 2.40±0.02 and 2.46±0.01; respectively.

At 25th days of storage the C and B treated samples spoiled and the mould growth appeared on the surface of cheese. From 25 days of storage till the end of shelf life for LF, Lz, B+ LF and B + Lz treated samples there were a significant difference between LF and Lz treated samples with other treated sample.

Mould count:

The results revealed that in the first 2 weeks of storage (zero, 8 and 15days) there was no growth of mould in all examined treated samples in all groups. At 17th days of storage the mean values of mould count ($\log_{10}$cfu/g ± SD) for C, B, B+LF and B+Lz treated samples were 1±0.0, 1.48±0.15, 1.70±0.09, 1±0.0; respectively while there were no growth of mould appeared in LF and Lz treated samples, This indicated the highly effect of LF and Lz on mould growth while no effect on Bifidobacterium alone on the mould growth.

At 21th days of storage the mean values of mould count ($\log_{10}$cfu/g ± SD) for C, Lz, B, B+LF and B+Lz treated samples were 2.56±0.02, 1±0.0, 2.51±0.03, 1.95±0.0, 2.32±0.04; respectively. While, there was no growth of mould in the LF treated samples. While, at 25th days of storage the C and B treated samples spoiled and mould growth appeared on the surface of cheese.

From 25th days of storage till the end of shelf life for LF, Lz, B+ LF and B + Lz treated samples there were a significant difference between LF and Lz treated samples with other treated sample.

Aerobic spore former count:

The results of examined cheese samples revealed that the aerobic spore former were not detected in all examined cheese samples at all stages of shelf life.

Coliform count:

The results of coliform count revealed that at zero day of manufacture there was no growth of coliform in all examined treated samples in all groups. At 8th days of storage the mean values of coliform count ($\log_{10}$cfu/g $\pm$ SD) for C and B treated samples were 1.90±0.05, 1.85±0.06 respectively while there were no growth of coliform appeared in LF, Lz, B+ LF and B + Lz treated samples This indicated the highly effect of LF and Lz on mould growth while no effect on Bifidobacterium alone on the coliform growth. Thus there was no significant difference between C with B treated samples.

Psychrotrophes counts:

These results indicated that there were significant difference between the C with LF and Lz treated samples From the day 17th till the end of shelf life but its not effect in high count of bacteria. On the other hand, the mean values of B groups (B, B+LF and B+Lz) started from 6.60±0.0, 6.59±0.01, 6.30±0.0 to 9.59±0.01, 7.96±0.0, 6.96±0.01at the end of shelf life respectively. These results indicated that there was no effect of bifidobacterium on the psychrotrophes.