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RECENT DECONTAMINANT CHEESE CLOTH REPLACER TEXTILE MATERILS IN SOFT CHEESE PROCESSING

Enaam, Shokery* [1] ; Alaa Arafa Badr ** and Ashraf El- Nahrawy **
**Dairy Science and Technology Department, Faculty of Agriculture, Alexandria University, Egypt.*
***Textile Engineer Department, Faculty of Engineering, Alexandria University, Egypt.*
** [1]Corresponding author: enaamshokery@yahoo.com*

ABSTRACT

This work aimed to investigate some of new fabric materials as a useful tool in cheese making. Two main yarn materials were used 100% cotton and 100% Tencel LF. Single and polyvinyl alcohol (PVA) in seventeen treatments were studied. The lower bacterial contents were observed with 100% Tencel single 0.78 log10 CFU /cm ^{2} , and 1.81 log10 CFU /cm^2 of polyvinyl alcohol 100% cotton .

The highest syneresis with control, polyvinyl alcohol, and cotton samples were recorded 218,304, and 340 ml. whey , respectively on the other hand, the low whey syneresis per ml. The best results were found with single and PVA cotton textiles.

***Conclusively,** the present investigation recommended Tencel PVA as a promising material for soft white cheese processing because the total solids of cheese curd sample was 70.85% and the lowest moisture content was determined in the rang 27.38 to 29.15 %. Also texture analysis results showed best Firmness, Adhesiveness, Cohesiveness and chewiness compared to the traditional cheesecloth as control.*

Keywords: Cheese cloth, new filter fabric materials, decontaminant yarn, cheese making, recent textile tools, whey cheese syneresis, cheese cloth types

INTRODUCTION

Soft white cheese is the most traditional and popular dairy product that is in high demand all over the world Researches on improving the technology of cheese production involve the use of various cheese cloth materials (Larionov *et el.,* 2020). Cheese safety is of paramount target to the dairy manufacturers, which includes the overall quality of row materials and equipment, such as healthy cheese cloth contains relatively few bacteria (102–103cfu.ml−1). Mukhiddinov *et al.* (2021) contaminated cheese with pathogenic microorganisms and/or their toxins at

the processing stages affected with the yarn substances used in whey filtration tools. This poses a threat to human public health risks and also causes quality defects in produced cheese, due to big economic losses (Fayed *et al*., 2018).

In order to determine the hygienic applications and controls in the dairy microbiological analyses have to be measured, and importance has to be given to whey syneresis , moist and total solids in cheese (Mavropoulos and Arvanitoyannis, 1999)

Therefore, The primary goal of this research was investigate possible unique new substituted textile material for white cheese in a dairy plant, Identifying these natural yarn helped us to project several solutions to eliminate or minimize the problems caused by old cheese cloth types used.

MATERIALS AND METHODS

1- MATERIALS

Represent all different material was used in the study as follows in Table 1.

Table (1): Materials and experimental design lines under this study

1-Fresh cow milk	8- Sterilized Plate count agar medium
2-Mesophilic starter culture MM100 LYO 125DCU	9- Sterilized- sod. citrate 2% glass dilution tubes
3-Traditional cheese cloth as control sample	10- Incubator 32-37 ^{o}C
4-Calcium chloride sol., 2%	11- Aluminum plates- dry clean sand – small glass rods
5-Liquid Rennet	12- Hot air oven 100 ^{o}C
6- Plastic boxes for cheese samples	13- Balance weight
7-Petri dishes	14. Dissector

2- METHODS

Cheese making:

Cow's milk was pasteurized for 30 minutes. The pasteurization at 72\30 min. was left to a temperature of 40C and added CaCl2 0.02 % and then mesophilic starter culture MM100 LYO 125DCU added incubated for 2 hours. The formed curd is then separated by 16 types of filter cloth , according to Budelli *et al*.(2012).

1- Whey syneresis was determined according to Soumaya El Bouchikhi *et al*.(2019).

2- Textural properties were measured with a texture analyzer as shown in Figure (1) (A. XT Plus Texture Analyzer, Stable Micro Systems, Ltd.). 45

mm disc probe Max recommended load: 5 kg Operating Temp: 10 °C (contact force 1 gm). Post-Test Speed: 10.0 mm/s. Distance 25mm). The software permits the calculation of samples: hardness, springiness, using texture analyser as described by Awad (2011).

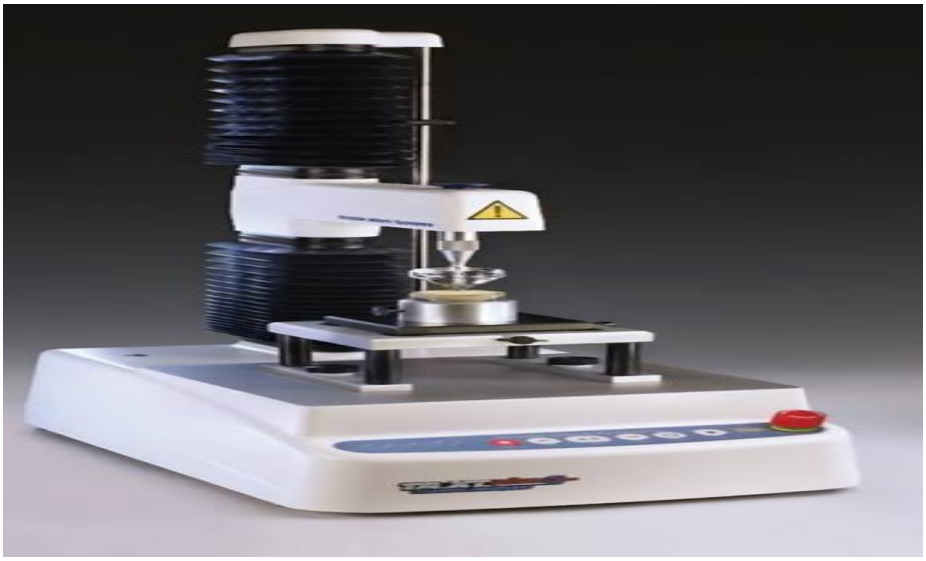

Figure (1) AXT Plus Texture Analyzer, Stable Micro Systems, Ltd.).

Adhesiveness, cohesiveness, gumminess, and chewiness. These texture profile parameters were obtained and calculated Textural properties were measured with a texture analyzer (A. XT Plus Texture Analyzer, Stable Micro Systems, Ltd.). 45 mm disc probe Max recommended load: 5 kg Operating Temp: 10 °C (contact force 1 gm). Post-Test Speed: 10.0 mm/s. Distance 25mm). The software permits the calculation of samples: hardness, springiness, as described by Awad (2011).

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3- Total solids and cheese moisture were carried out according to A.O.A.C. (1980).

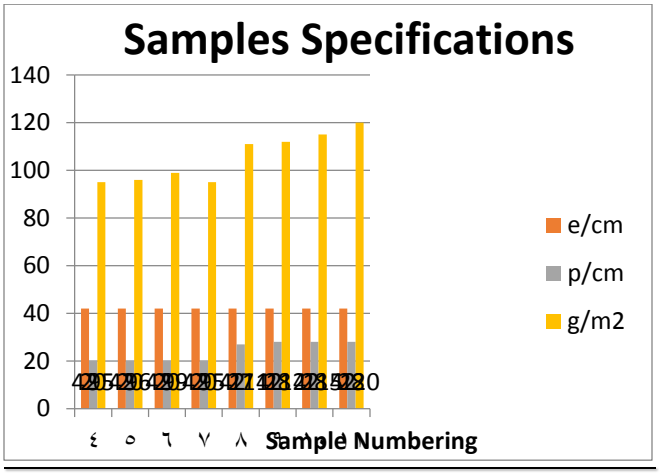
4-Quantitive Microbiological analysis of yarn materials performed as Veronika Lehotová *et al*. (2021).

RESULT AND DISCUSSION

The results of studies of cheese samples specification ,whey syneresis, texture analysis ,solids\ moisture% and total bacterial counts during Autumn of 2024 are presented in Tables 2, 3, 4 and 5 . The results showed that the type of the cheese cloth was very influential on the resulting soft cheese. influences the texture quality of soft cheese, mainly water content, syneresis , and bacterial counts (Figures, 3, 4, 5, and 6). Whey syneresis was optimum in 100%Polyvenyl alcohol tencle (PVA tencel (100ml.) as compared with control (50 ml.) after 30 min. In the same time cotton PVA recorded 170 ml.

Table (2) Sample specifications

Sample Numbering	Yarn Material	Single or Ply with PVA	e/cm	p/cm	g/m2
4	100% Tencel LF	Single	42	20	95
5	100% Cotton	Single	42	20	96
6	100% Tencel LF	Ply	42	20	99
7	100% Cotton	Ply	42	20	95
8	100% Cotton	Ply	42	27	111
9	100% Cotton	Single	42	28	112
10	100% Tencel LF	Single	42	28	115
11	100% Tencel LF	Ply	42	28	120



Figure(2). Samples Specification

Table (3) Syneresis of whey in tested cheese samples

Sample No.	ml. syneresis \Time min.						
	5	10	20	30	40	50	60
c	60	69	90	130	136	152	218
4	42	53	58	102	106	122	140
5	20	27	39	52	73	86	106
6	75	83	91	118	116	120	169
7	30	42	52	79	98	120	164
8	2	5	7	38	50	59	90
9	20	50	53	92	110	121	152
10	47	62	80	162	170	250	280
11	40	66	105	210	166	210	250
4PVA	100	109	196	205	215	310	340
5PVA	30	40	67	101	140	260	300
6PVA	35	50	59	119	144	216	280
7PVA	60	104	180	214	330	350	390
8PVA	20	40	62	119	180	270	300
9PVA	40	44	65	91	112	150	291
10PVA	50	50	66	89	170	192	240
11PVA	20	38	109	204	256	290	204

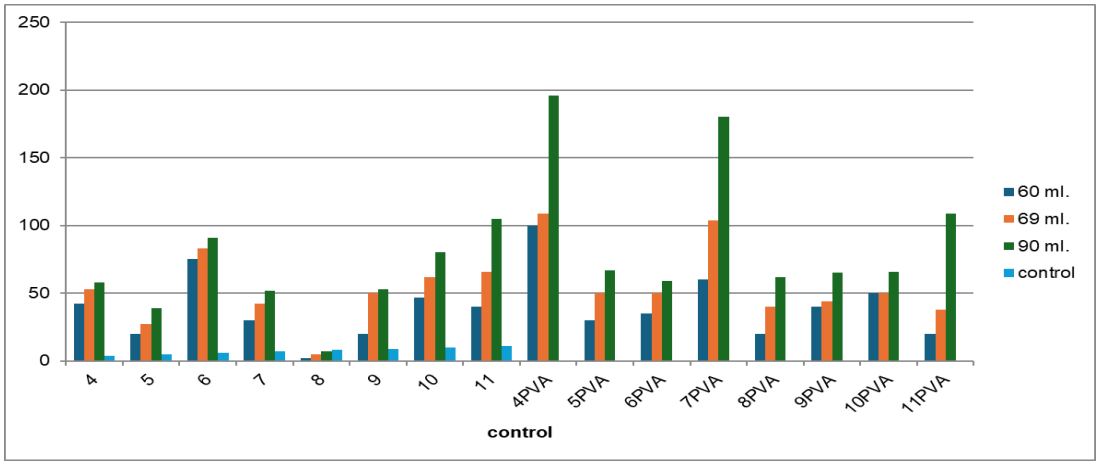


Figure (3) Synergism of whey in tested cheese samples

Table (4) Texture analysis of yarn samples

Sample No.	Firmness	Adhesiveness	cohesiveness	Springiness	Gumminess	Chewiness
C	524.95	8.54	0.82	6.1	432.99	264.21
4	663.09	10.24	0.85	7.3	563.63	4114.52
5	261.09	6.84	0.78	5.5	203.42	1118.8
6	467.85	14.06	0.81	6.3	379.54	2391.07
7	207.45	5.17	0.79	4.5	164.54	740.44
8	634.17	10.35	0.86	7.4	543.19	4019.6
9	65.51	1.59	0.31	3.5	20.54	71.88
10	114.86	3.2	0.64	3.7	7403.	273.92
11	105.14	3.41	0.69	4.1	72.72	298.17
4PVA	806.76	18.34	0.93	8.4	750.53	6304.46
5PVA	319.82	11.84	0.76	5.8	244.64	1418.92
6PVA	136.96	3.52	0.60	4.3	81.95	352.39
7PVA	140.25	4.08	0.65	4.4	90.67	398.94
8PVA	242.76	6.30	0.76	5.2	184.91	961.53
9PVA	524.95	8.54	0.82	6.1	432.99	2641.21
10PVA	204.23	5.11	0.79	4.2	166.54	291.56
11PVA	802.67	17.94	0.91	8.6	755.43	590.48

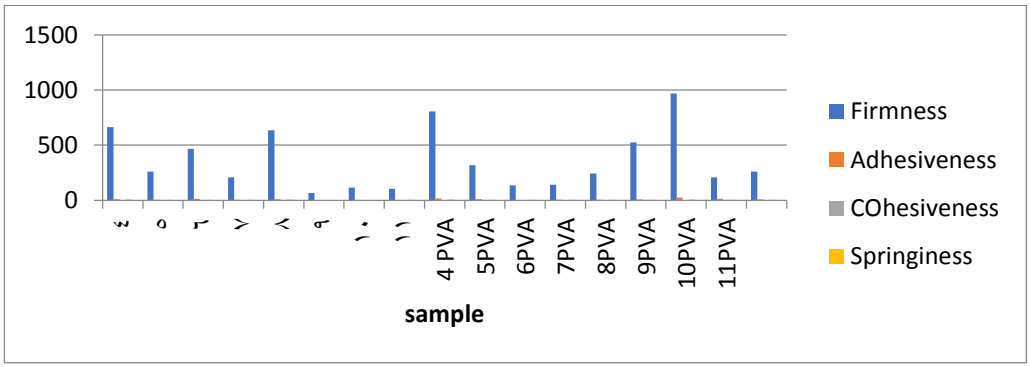


Figure (4) Texture analysis of yarn samples

The present data in Table (4) and Figure (5) are shown the texture analysis of different cheese treatments. According to the results of the figure below , it is clear that the cheeses manufacture using tencle 100% single and PVA textile have a very good Firmness , Adhesiveness , Cohesiveness , Springiness and Gumminess ,663.09, 10.24, 0.85, 7.3,and 563.63 with 100% single tencel ,

respectively. While, 207.08, 13.6, 0.66, 4.45, 216.15, and 1620.44 with 100% PVA tencel, respectively. Soft cheese produced from various treatments has a distinctive moisture and total solids percent as shown in Table (5). According to Andi Sukainah *et al.,* (2021) soft cheese has a water content 67.32 % ±0.45 with 100% single tencel , respectively. While, 207.08, 13.6, 0.66, 4.45, 216.15, and 1620.44 with 100% PVA tencel, respectively. compared with the average of our water content, which was 66.55% specifically for soft cheese produced with the 100% single tencle was 57.48 %.

In this study, the mean bacterial counts for The recommended textile were obtained as bacterial population on plate count agar medium is 2.85 $\log_{10}$ \cm as shown in Table 6 . The lower bacterial content can be observed with 100% single tencel and 100% cotton PVA 0.78 and 1.81 $\log_{10}$ \cm, respectively.

Table (5) Total solid \ Moisture of cheese samples

Sample No.	TS%	Moisture %
C	58.65	41.35
4	42.52	57.48
5	33.65	66.35
6	30.36	69.64
7	32	68
8	40.5	59.5
9	39.16	60.84
10	12.12	87.88
11	30.91	69.09
4PVA	18.56	81.44
5PVA	72.62	27.38
6PVA	33.85	66.15
7PVA	19.79	80.21
8PVA	7.38	80.62
9PVA	20.99	79.01
10PVA	17.93	82.07
11PVA	70.85	29.15

In this study, the mean bacterial counts for the recommended textile were obtained as bacterial population on plate count agar medium is 2.85 $\log_{10}$ \cm.

The lower bacterial content can be observed with 100% single tencel and 100% cotton PVA 0.78 and 1.81 $\log_{10}$ \cm , respectively. Figure7 show the minimum microbial counts, which regarded with treatments 100 % single

Tencel as compared with the traditionally cotton single used in cheese making. The bacterial count was disagree with associated by Khafaji and Salih Al-Saadi (2023) who reported $5x10^2$- $8x10^2$ CFU\g .

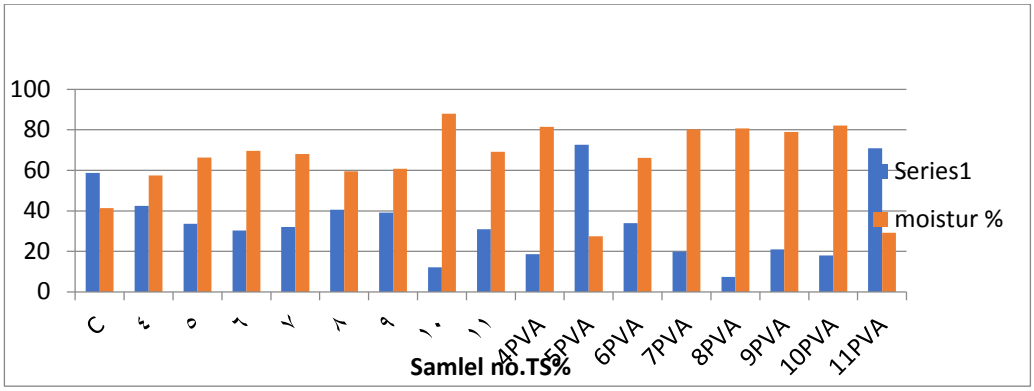


Figure (5) Total solid \ Moisture of the different cheese samples

Table (6) Microbiological analysis of different yarn

Sample No.	Count on PCA ,cfu/ cm^2	Log 10 \cm
C	3.50×103	3.54
4	6.47×103	3.81
5	4.60×103	3.66
6	1.80×103	3.26
7	5.10×103	3.7
8	7.97×103	3.9
9	12.97×103	4.11
10	0.006×103	0.78
11	0.50×103	2.69
4PVA	0.39×103	2.59
5PVA	0.065×103	1.81
6PVA	1.36×103	3.13
7PVA	3.66×103	3.56
8PVA	0.24×103	2.38
9PVA	0.151×103	2.18
10PVA	0.97×103	2.99
11PVA	0.123×103	2.09

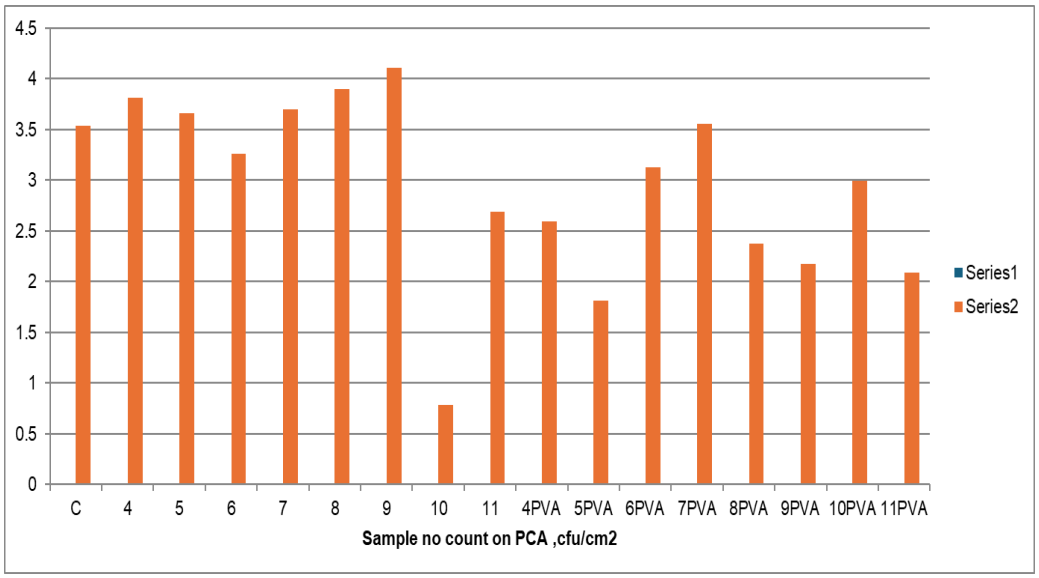


Figure 6.Microbiological analysis of different yarn materials:

100% Single tencel

100% Single cotton

Figure (7) Microbiological analysis of single Tencel yarn material and single cotton cheese cloth

Conclusion

Cotton samples are the lower whey synersis comparing to tencel and control (normal cheese cloth). Single cotton specimens are the lowest whey synersis when compared to poly-vinyl alcohol treated cotton yarn Figure 8).

Figure (8). Poly-venyl Tencel yarn materials

Recommended Single tencel is given the highest whey draining amounts 50ml.\5min. Texture properties showing the ideal form. Also, with single tencel, poor results with PVA tencel Regarding the TS% and moisture with single and PVA tencel, then cotton single and PVA comparing to control. Microbiological analysis revealed that the optimum yarn (the lowest bacterial count CFU\cm) was detected with single tencel then, cotton single and PVA. The highest bacterial contents were measured by control.

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