

EXTEND THE SHELF LIFE AND IMPROVING SENSORY PROPERTIES OF WHITE SOFT CHEESE BY ADDING CELERYLEAVES

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ABSTRACT

This study was aimed to investigate the effect of addition different concentration of celery leaves to white soft cheese, Treated cheese between 2018-2019, The finely Celery (*Apium graveolens*) leaves were adding to crude white cheese after texturizing in three levels included (A,B,C) in addition of control antimicrobial activity of celery treated cheese against total account bacteria and coliform bacteria was estimated during (0, 5, 10, 15, 20) days. The results were shown that the higher concentration of celery in treated cheese, had a lower concentration of protein, lipid and ash content (16.81,15.13 and 4.30% respectively, but it had a higher moisture content 59.50%.also the total bacteria counts were decreasing significantly (0.05 P)with accumulative of cheese during astorage periods, it was reached to 1.3×10^5 , 9.5×10^3 , 9×10^3 , 7.62×10^3 , 1.05×10^4 (cfu/g) respectively comparing with control samples, the number of coliform bacterial in celery treated cheese, at concentrations 15% was achieved significant difference comparing with other samples (8×10^3 , 10.2×10^4 , 9.7×10^4 , 8.9×10^5 , 9.5×10^7 (log cfu/g)) respectively.

Key word: apium gravioules, sensory evaluation, bacteria, lipid.

عودة وآخرون

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اطالة العمر الخزني وتحسين الخصائص الحسية للجبن الابيض الطري الناعم باضافة اوراق الكرفس
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المستخلص

هدفت الدراسة الحالية الى دراسة تاثير اضافة تراكيز مختلفة من الكرفس الى الجبن الطري الناعم لغرض اطالة العمر الخزني وتحسين الخصائص الحسية حيث اجريت الدراسة خلال عام 2018_2019 اضيفت اوراق الكرفس الناعم الى الجبن بثلاث مستويات هي A,B,C بالاضافة الى معاملة السيطرة، قدرت الفحوصات المايكروبية العدد الكلي للبكتريا ويكتريا الكوليفورم هلال فترات خزن (0,5,10,15,20) يوم، اظهرت النتائج ان اعلى تركيز لاوراق الكرفس المضافة الى الجبن الابيض قد اعطت اقل محتوى من البروتين والدهن والرماد اذ بلغت (4.30,15.13.16.81) % على التوالي تشخيص تاثير اضافة مستويات مختلفة من اوراق الكرفس الى الجبن الابيض الطري لزيادة فترة اضيفت ثلاث مستويات مختلفة من اوراق الكرفس المثلوم ناعما الى الجبن الابيض الطري (10,15,5) %خلطت بثلاث معاملات A ,B,C اضافة الى معاملة المقارنة. قدرت الفحوصات المايكروبية، العدد الكلي للبكتريا ويكتريا الكوليفورم خلال فترة الخزن (0,5,10,15,20) يوم اظهرت النتائج من هذه الاختبارات بان اعلى تركيز من اوراق الكرفس في الجبن الابيض الطري اعطى اقل محتوى من الرمد، الدهن البروتين اذ بلغت 4.30، 15.13، 16.81 %على التوالي ولكنها احتوت على اعلى نسبة من الرطوبة اذ بلغت 59.50 % . كذلك لوحظ انخفاض معنوي في العدد الكلي للبكتريا p(0.05) بزيادة تراكيز الكرفس في النموذج خلال فترات الخزن المدروسة، اذ بلغت (1.3×10^5 , 9.5×10^3 , 9×10^3 , 7.62×10^3) cfu مقارنة مع نموذج السيطرة، واختلفت المعاملة TC (Treatment C) معنويا مقارنة مع بقية المعاملات اذ بلغت 8×10^3 , 9.5×10^7 cfu/g, 8.9×10^5 , 10.2×10^4 , 9.7×10^4 على التوالي اظهرت المعاملة TC اعلى قيم في التقييم الحسي للنكهة والتقبل العام وتماسك القوام اذ بلغ مجموع النقاط 45 نقطة

الكلمات المفتاحية: اوراق نبات الكرفس، الجبن الطري الابيض، الفعالية المضادة للاحياء المجهرية، التقييم الحسي

INTRODUCTION

Food preservatives very effected for degreasing the food damages, improving and achieved good destruction, The preservatives have continues interesting to used, but must to be safe for human combustion (11) Polyphenols are one of the major antioxidant in human and its derived from plants, it's really appear a wide organic occupation, including antioxidant, apoptosis, antiaging, anticancer, in addition to inhibitor of angiogenesis and cell propagation accomplishments (14). Cheese is the famous food in the worldwide. Its production from milk by different ways and technologies enables. Because the delicious test, it is rich with proteins, and considered a healthy food (24) its utilization has amplified in latest years. .cheeses are very suggestible to infectivity by pathogenic and spoilage microbes, which can shrinkage the shelf life, causing recollections, leading to a peril to the consumer's health. Among pathogens, *L. monocytogenes*, *Stap. aureus*, and *Salmonella* spp. are regulary correlated with food eruptions from the utilization of cheese (15).Equally, determined by the unease about health and well-being, punters have claimed securer and healthful food, free of artificial additives, which are regularly reflected unsafe and carcinogenic materials (21). So as to convene the new requirments from More lately, because of the probable antimicrobial cause they have appealed the enlarged interest of food experts and technicians as natural preservatives (12). Herbs are generally organized as ingredients Generally Recognized as Safe (10). The natural components must have high stability when it is adding to food. Sometime the natural compounds normally irritable to oxygen, light, temperature, and pH 8, and can be loss below managing of cheese(19) observed a reduction inside the component matter of *Ocimum basilicum* (basil) and *Tanacetum vulgare* (tansy) enhanced through cheese preparation. comparably (20) registered that 37.49% of the rosemary whole volatiles of (*Rosmarinus officinalis*) enhanced to sheep milk were misplaced through cheese makin, so, the attention of plant excerpts (*Rosmarinus officinalis*) to exist limited for amalgamation into cheese should provide the probable in

food preparation , so as to support acceptable microbiological reticence (15, 20,32,33). The main aim of this study was to analysis the influence of the addition Celery to the white soft cheese on microbial population to improvement the sensory properties of the treated cheese.

MATERIALS AND METHODS

Preparation of the soft cheese combined with celery (*Apium graveolens*) Leaf.

A composition analysis of fresh cow's milk was performed by using a milk analyzer (Lacto Flash, Gerber, Germany). The milk was emptied in a antiseptic cheese-formulating container at 90 C' for 2sec, then cooling down the milk to 45C. Celery leaves cut finely and soaked in water 75C° at to become withers and easy to mixing with the raw milk, Then it adding in the level 5, 10 and 15% namely A,B,C respectively . 0.002 % of microbial Rennet (Microbial Meito Rennet, Japan) was supplemented to the milk. incubated with room temperature,and the coagulates were removed in to antiseptic mesh for lack of moisture and filtration for 2 hr at room temperature. IN the end of the dehydration periods, the cutting and shaping of coagulates were completed. Cheeses were transferred into antiseptic vessels and apportioned in to pieces, The first piece was used to study sensory and the second piece to study microbial evaluation, Then stored at 4°C for two days for the next experiments:-

Study the sensory propeties of prepared cheese incorporated with different concentration of celery leaf (*Apium graveolens*)

Evaluated factor

include, colour , flavor, texture, and overall acceptability that using in sensory evaluation sheet as describes by (19), the sample that examined in the texture tests cheese texture properties (surface roughness, surface moisture, elasticity, and hardness). were cut for getting a suitable cubes (2.5 cm). aimed to measure main The Adjusters were recruited among people living in Baghdad city; they was employer at University of Baghdad (10 potential selected). All the selected were briefed on the scope of the sensory evaluation technique.(18).

Study the antimicrobial activity of prepared cheese incorporated with different concentration of celery leaf

Ten undesirable in food products species, namely *Salmonella*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *E.coli*, *Luconostic*, *Bacillus thermogenesis*, *Aspergillus niger*, *Aspergillus sp*, *Pencillum* and *Rhizopus oryzae*, were selected from the Microbiology Lab – collage of agriculture / University of Baghdad and used as test culture.. 0.5 ml of 1.75% Barium Chloride blended with BaCl₂.2H₂O and completed to 99.5 ml of 1% Sulfuric Acid H₂So₄. Turbidity is e to 1 × 10⁸ colony formation unit (CFU) / ml. The colonies of the bacterial pathogen were transported by Equivalent loop to 4 ml of the peptone water and the transport continues until the turbidity of peptone water is equal to the turbidity of McFarland suspension (2). It is evaporated to concentrations from a raw leaves extracts by dissolving 1 g of raw extracts in 10 of DMSO to obtain a concentration of 100mg/ml, and dissolving 2 g of extracts in 20 ml of DMSO to get a concentration of 50 mg/ml (5).

Statically analysis

The data were limited utilizing Duncan's multiple range test at a level of P 0.05. Statistical assay was worked by (SAS).

RESULTS AND DISCUSSION

Chemical Composition of prepared cheese Incorporated with different levels of Celery.

Table 1. show chemical analysis of processed ches Incorporated with Celery (*Apium graveolens*) Leaf, There is not significant difference in moisture, Protein, lipid and ash content among all treatments. it was found out that the higher concentration of celery in manufacture cheese, had the lower in the protein, lipid and ash content was 16.81,15.13 and 4.30% respectively, but had the higher moisture content was 59.50% comparing with control sample was 58.01% . , Protein and other composition content of bovine milk cheese has received increased interest in recent years because an increasing proportion of milk is used for manufactured products such as cheese (7), The scientific research on this subject is few for compared with our results significantly

Table 1. Chemical composition of prepared chees with different levels of celery

Treatment	Moisture %	Protein%	Lipid%	Ash%
Control	58.01 ±0.57a	17.98 ±1.43a	16.28 ± 0.57a	4.20 ± 0.57a
TA	58.31 ±0.57a	17.95 ±1.73a	15.93 ± 0.57a	4.25 ± 0.57a
TB	58.17 ±1.52a	17.36 ±1.73a	15.63 ± 0.57a	4.27 ± 1.00
TC	59.50 ±1.00a	16.81 ± 2.30a	15.13 ± 2.30a	4.30 ± 0.57a
Significant level	N.S	N.S	N.S	N.S

Values are given as mean ± standred diviation

Values with similar letters are not significantly various (P<0.05).

TA treatment (5% celery leaves)

TB treatment (10% celery leaves)

TC treatment (15% celery leaves)

Total microbial count (log cfu/g) of prepared cheese incorporated with different concentration of (*Apium graveolens*) Celery leaf stored under varied period storage at 4C

Table 2. explain that the overall bacterial calculation reduce constantly through the time of conservation and were affected significantly (P<0.05) with increasing of celery leaf level in the sample during storage at 0,5,10, 20 days were 7.62x10³, 9x10³, 9.5x10³, 1.05x10⁴, 1.3x10⁵ (log cfu/g) respectively in (TC) comparing with control Chees samples were 8x10³,10.2x10⁴, 9.7x10⁴, 8.9x10⁵, 9.5x10⁷(log cfu/g) respectively. This result was agreed with (34). It can be resolved that bioactive complexes in this plant have an antibacterial influence (14). Furthermore, it had been

reported that Trans carbo phyllene has a extremely great antimicrobial ability versus Gram-positive bacteria (15) Overall, the biological ability of plant extract is associated with their chemical constituents, which are depend on plant genotype and distrubed by a number of elements, invoving environmental, geographical and agricultural circumstances (16). similar (17) reported a decrease of total count bacteria of traditional turkey chees

(örgü). A decrease in the a count of total account bacteria of chees could be due to decrease of water activity and to increasing of cheese acidity and this decreased could be explained by antimicrobial compound of celery leaves. A paper registered that supplement of clove essential oil (2.0 %) appeared antibacterial influence versus E. coli and Vancomycin-resistantet; Enterococci in Feta cheese amassed at 7°C for 14 days (9).

Table2. Effect of different concentrations of (*Apium graveolens*) leaf incorporated with white soft cheese on total count bacterial counts (CFU/g) during storage at 4C°.

Treatments	Total Count Bacterial (CFU/g)				
	Zero	Storage Time			
		5 days	10 days	15 days	20 days
Control	8x10 ³ ±0.17	1.92x10 ⁴ ±0.48	9.7x10 ⁴ ±0.27	8.9x10 ⁵ ±0.15	9,5x10 ⁷ ±0.26
TA	8.3x10 ³ ±0.24	9.7x10 ³ ±0.31	9.7x10 ³ ±0.23	1.8x10 ⁴ ±0.20	6x10 ⁶ ±0.12
TB	7.81x10 ³ ±0.18	9.3x10 ³ ±0.17	9.3x10 ³ ±0.17	1.05x10 ⁴ ±0.04	2.9x10 ⁵ ±0.11
TC	7.6x10 ³ ±0.24	9.01x10 ³ ±0.09	9.5x10 ³ ±0.16	1.05x10 ⁴ ±0.008	1.3x10 ⁵ ±0.12

Values are given as mean ± standred diviation

Sensory estimation of white soft cheese prepared using different concentration of Celery leaf.

Table 4 shows the results for the sensory characteristics estimation of white soft cheese samples prepared using different concentrations (5%, 10%, 15%) of celery leaf. In this study, the parameters tested were texture, color, flavor, strength, bitterness and overall acceptability. The sensory analysis reveals that there is no significant effect of celery leaf addition on sensory attributes of white soft cheese. The white soft cheese prepared with different concentrations of celery leaf was not significantly differed from

the control cheese, except for the flavor. The white soft cheese prepared with 5% and 10% of celery leaf had higher scores of flavor and was more acceptable as compared to the control cheese. However, increasing celery leaf concentration did not significantly affect flavor scores of the cheese produced. In general, no significant differences between the treatments and all were acceptable by panelists. Other findings mention that herbs like oregano and rosemary essential oils mention to high defending influence versus lipidoxidation and fermentation in (31). Comparable grades were registered for cheese samples supplemented using various deliberations of rosemary quotation (1).

Table 4. Sensory evaluation to prepared soft white chees incorporated with different levels of (*Apium graveolens*) celery leaf

Treatment	Rheological Properties						Total Scores
	Color	Flavor	Texture	Strength	Overall acceptability	Bitterness	
Control	10 ± 0.57a	5 ± 0.57c	8 ± 0.57a	10 ± 1.15a	8 ± 0.57a	7 ± 0.57b	48
TA	8 ± 0.57b	9 ± 1.15ab	8 ± 0.57a	9 ± 0.57ab	9 ± 0.57a	7 ± 0.57b	50
TB	8 ± 0.57b	10 ± 1.15a	7 ± 0.57a	9 ± 0.57ab	10 ± 1.73a	10 ± 0.6a	54
TC	7 ± 0.57b	7 ± 0.57bc	5 ± 0.57b	7 ± 0.57b	7 ± 0.57a	10 ± 0.6a	45
	N.S	N.S	N.S	N.S	N.S	N.s	

Means with equal letter have no significant difference .

Coliform count (cfu/g) of prepared cheese incorporated with different concentration

of (*Apium graveolens*) Celery leaf stored under varied period storage at 4C°: Statistical analysis in table 3. Showed different

effects in the concentrations of ACLE related varying along with CFU/g in white cheese presented that the overall concentrations of ACLE had a significant effect on the growth of Coliform bacterial counts ($P < 0.05$). The testing of Anova table appeared the growth of Coliform bacterial counts in white soft cheese, with concentrations of 5, 10 and 15% of ACLE(Aquatic Celery liquid Extract) was significantly reduction ($P < 0.05$) comparing with the control sample (Table 3). (22) studied The antimicrobial effects of celery, coriander

herb and seeds essential oils at concentrations of 0.3, 0.6, 0.9, 10, 50 and 100% were determined in comparison with phenol concentration of 1.0 and 10% against five bacterial strains, two yeast strains and five mold, Therefore reported can used these essential oils as native antimicrobial and antioxidant in industrial food and drugs. As for, the antimicrobial effect of celery and coriander essential oils, it could be related to major component d-Limonene and Linalool, according to (25 , 31 , 4)

Table3. Effect of different concentrations of (*Apium graveolens*) leaf incorporated with white soft cheese on Coliform bacterial counts (CFU/g) during storage at 4C°.

Treatments	Total Count Bacterial/ CFU/g Storage Time				
	Zero	5 days	10 days	15 days	20 days
Control	9.15x10 ^{±0.23}	1.50x10 ^{±0.14}	9.50x10 ^{±0.15}	9.9x10 ^{±0.17}	1.3x10 ^{±0.11}
TA	5.31x10 ^{±0.22}	8.09x10 ^{±0.11}	8.9x10 ^{±0.05}	9.25x10 ^{±0.06}	6.23x10 ^{±0.11}
TB	3.42x10 ^{±0.15}	3.50x10 ^{±0.13}	6.10x10 ^{±0.10}	8.44x10 ^{±0.11}	2.15x10 ^{±0.08}
TC	2.83x10 ^{±0.09}	2.91x10 ^{±0.10}	4.08x10 ^{±0.11}	5.59x10 ^{±0.13}	1.73x10 ^{±0.12}

Values are given as mean ± standard deviation

LSD to treatments=0.1729

LSD to times =0.1933

LSD to correlation =0.3865

Fig1. Treatment A,B and C of soft white cheese incorporated with different levels of (*Apium graveolens*) Celery leaf.

Conclusion

This paper indicated that the addition of Celery (*Apium graveolens*) leaf improved the quality of white soft cheese and affected significantly on flavor and overall acceptance of the final product. These findings suggest that the white soft cheese forfit with Celery (*Apium graveolens*) is a functional food that can exert antibacterial properties and have verified to be natural preservatives have substantial inhibitory ability versus gneral microbes.

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