Novel Recipes of Probiotic Low Fat Labneh Cheese as Natural Flavouring Salads in Hotel Meals

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Abstract

The growing demand for functional foods is stimulating innovation and new product development in the food industry internationally.The food industry has a central role in facilitating healthier eating practices through the provision and promotion of healthy foods.

Flavoured probiotic low fat labneh cheese as salad was prepared by incorporating 15 % of natural vegetables (red beet, carrot and chicory) which have natural flavouring ; colouring ; prebiotic and antioxidant components. Novel recipes were served in hotels and fast foods resturant for sensory evaluation.

Data indicated that the addition of carrot and chicory to the labneh resuted in elevting the viability of lactic acid bacteria at a range of 2.8 and 8.8 % respectively as compared with plain control labneh after 7 days of storage at 5˚C. It was obvious that addition of the aforementioned vegetables resulted in lowering the degree of syneresis of labneh. On the othre hand, chicory labneh was more acceptable than their counterparts containing carrot and red beet along with the control labneh. Chicory and carrot labneh were more acceptable in hotels wherease chicory and beet labneh were more acceptable in fast foods restaurants. The successful flavouring and colouring of low fat labneh with natural vegetables(beet, carrot ,chicory) could add to the variety of prepared salads. Moreover, the labneh recipes formulated in the present study allows production of various recipes of flavouring cheeses based salads that cope with current demands or needs of hotels, restaurants, fast food outlets and institutional consumption.

Keywords: recipes, labneh ,cheese salad , hotel , functional food , probiotic , natural additives ,viability.

Introduction

The growing demand for functional foods is stimulating innovation and new product development in the food industry which plays a key role in facilitating healthier eating practices through the provision and promotion of healthy foods. Continuously increasing consumer health consciousness and expenditure are socio-economic factors responsible for the expanding worldwide interest in functional foods. Recent projects have demonstrated that, with co-ordinated efforts towards communication and a scientific approach to selecting and applying probiotics, functional food products can be developed with measurable health benefits for consumers.Probiotic strains can be successfully manufactured and incorporated into highly acceptable food products where they can retain their viability and functionality. (Mattila- Sandholm *et al*., 1999 and 2002).

Before a functional food and probiotic can benefit human health it must fulfill several criteria.It must have good technological properties so that it can be manufactured and incorporated into food products without loosing viability and functionality or creating unpleasant flavours or textures.(Childs ,1994)

Careful screening of probiotic strains for their technological suitability can also allow selection of strains with the best manufacturing and food technology characteristics.The new food products must fulfill the customer's various needs and desires. These may include greater convenience, longer keeping quality, added flavour appeal, and other sensory quality improvements.The probiotic and functional food concept is today widely spread in the scientific and industrial fields(Blumberg ,1994) ,however, further scientific input is required. Future research on probiotic bacteria will focus on selecting new and more public products and develop novel technology or artificial probiotic applications.Special food demand for dietary purposes also is increasing. Reduced-fat cheese is becoming more popular, but it is difficult to produce a high-quality, reduced-fat cheese with comparable flavour and texture properties to full-fat cheese (Bryant *et al.*, 1995; Drake and Swanson, 1995). Among the many possibilities, the use of vegetables(beet, carrot ,chicory) for flavouring and colouring dairy fermented product based probiotic low fat labneh as a salad seemed to offer a good potential and functional target (Shahidi F. 2000.). The successful flavouring and colouring of low fat labneh with natural vegetables would add to the variety of prepared

salads in many restaurants, fast foods outlets , hotels and institutional consumption.

Labneh (also spelled Labaneh or Lebnah)is a thick, rich yogurt cheese from the Eastern Mediterranean (Tamime et *al.*, 1989). It is a good lowfat substitute for cream cheese and sour cream. It is good with toast, fruit preserves, sandwiches, crackers, or veggie sticks. Labneh is a white to creamy paste that has a smooth texture, with a taste crossing between sour cream and cottage cheese and a characteristic sharp flavour that is largely modulated by diacetyl produced during fermentation (Varnam and Sutherland, 1994; Tamime and Robinson, 1999).It has been the main interest of numerous investigations(El-Gendy 1983; Rao ,1987 ;Turkane et al 1999 ; and Say& ŠDahan 2002). Labneh is also good as it thickens salad dressings with a pleasant tang and creamy texture. (Keceli,1999 and Nsabimana**,** *et al* 2005)

The present study relates generally to a process for producing a flavoured probiotic low fat labneh cheese based salads that do not require curing or aging. Such a process allows the preparation of a wide variety of flavoured probiotic low fat labneh cheeses having desired flavours belonging to natural vegetables (beet, carrot ,chicory) if is worth to mention that these vegetables possess prebiotic and antioxidant potency. Moreover, the process of the present study can allow the rapid production of various serving of flavouring cheeses based salads depending on current hotel demands.

MATERIALS AND METHODS

Microorganisms

Streptococcus salivaris ssp. thermophillus and Lactobacillus blulgaricus as a yoghurt starter were used in the present study , these strains were obtained from Hansen's Laboratories, Copenhagen/Denmark.

Counting media

Moulds and yeasts were counted on potato dextrose agar as described by APHA, (1992).On the other hand, lactic acid bacteria were enumerated according to standard procedures (Marshall, 1993).

Analytical methods:

The pH ,acidity, total solids protein, fat, lactose, ash, and water contents of labneh were determined according to AOAC (1995).. Syneresis was measured as

described by Schmidt and Bouma (1992).A 20-g sample of labneh was spread in a thin layer over a Whatman No.2 filter paper, fitted into a 10-cm diameter Bu¨chner funnel, and vacuum filtered for 10 min. Syneresis, expressed as % free whey, was calculated as follows:

% Free whey = weight of initial sample − weight of sample after filtration / weight of initial sample × 100

All determinations were carried out in triplicate.

Preparation of vegetables puree and extract:

All vegetables were cleaned from sediments, washed with tap water.Carrot and beet blanched at 90°C for 25-35 min in boiling tap water, cooled by running tap water and then grond blended for 3 min to obtain fine particles (puree) and stored until used. On the other hand ,chicory was blended for 3 min to obtain fine particles and then drained from water and the extract was stored until used.

Production of Labneh:

Concentrated Yogurt (Labneh):

Cloth-bag labneh,was produced by the procedure shown in (Fig.1) which is similar to that described by Yamani and Abu-Jaber (1994).The product was made by heating cow's low fat milk to 85°C for 20 min, cooling to 40°C, inoculating with 2% starter culture (*Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* in equal proportions) and holding for until a pH 4.6 was attained. The resulting yogurt was placed in cloth bags and left to drain by gravity at 6°C overnight. The obtained labneh was packed in PVC containers (250 g).

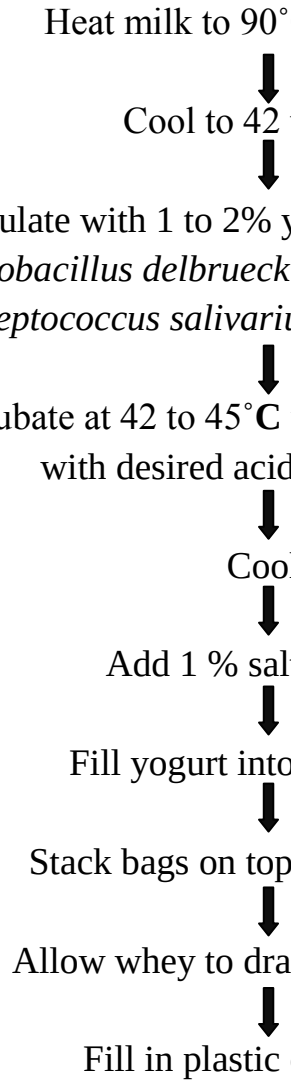

Figure (1): Flow sheet showing of Procedure producing labneh by the traditional method.

Preparation of probiotic flavoured fermented labneh cheese based salads:

The method followed in the preparation of probiotic flavored fermented labneh cheese based salads is summarized in Figure (2).On the other hand, vegetables puree and extract along with final product of probiotic flavoured fermented labneh cheese based salads variants are shown in Figure (3). Low fat labneh cheese was devided into four treatments, namely control Plain witout flavoring, with carrot puree (15%), with beet puree (15%) and With chicory extract (15%).

Figure (**2**): Preparation of probiotic flavored fermented cheese based salad

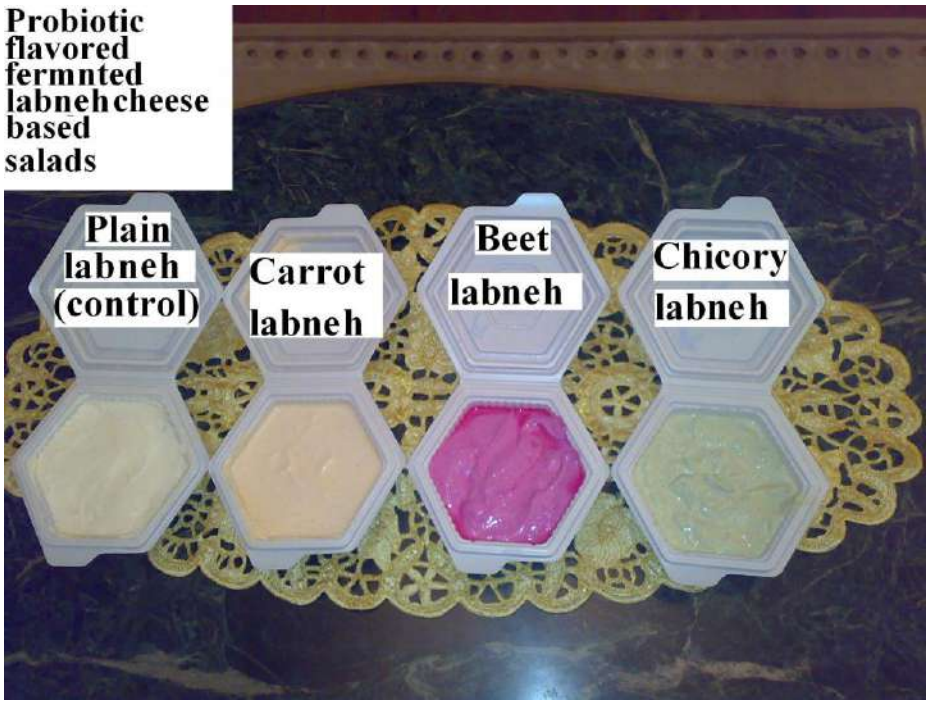

Figure (3): Vegetables puree and extract and final product of probiotic flavored fermented labneh cheese based salads variant.

Sensory evaluation

Probiotic flavoured fermented labneh cheese based salads were organolepticaly evaluated as fresh and stored product, in accordance with the hedonic scale from 1 to 5 for each character. Samples were scored for colour, taste, odour, texture, appearance and acceptability by 25 person in two hotels (5 stars) ; two hotels (4 stares) and two fast foods outlets. Probiotic flavoured fermented cheese based salads samples were served in 250 ml plastic package labeled with random three digital codes. Hedonic scale was used to measure the acceptability in terms of criteria and overall (Bodyfelt *et at.,* 1988) .

Statistical Analysis

Data were calculated as mean ± standard deviation (SD) and were further analyzed using analysis of variance (ANOVA). Probability of 0.05 or less ($P< 0.05$) was considered significant. The statistical package of Costat Program (Costat 1986) was used for all organoleptic data.

RESULTS AND DISCUSSION

The chemical composition of prepared crud labneh is given in Table (1)

Table 1:The pH value and chemical composition (% on wet wieght basis) of prepared plain labneh.

pH	4.05
Titratable acidity of lactic acid	1.6
Moisture	81.1
Protein	9.1
Fat	1 .5
Lactose	7.1
Ash	1.2

The chemical composition of prepared plain labneh was within the range (except fat) reported for the product by Yamani and Abu-Jaber,(1994) , O¨ zer *et al.*, (1999); El-Nemr *et al.* (2004).

Physico-chemical properties of probiotic flavored fermented labenah cheese based salads:

Data in Table (2) reveal changes in pH, acidity during storage of probiotic flavoured fermented cheese based salads. The pH of all treatments, including the control, decreased slightly during storage, the range of pH being 3.7 - 4.05 ; 3.8 – 4.01 ;3.9 – 4.10 and 3.85 – 4.25 for the control,beet , carrot and chicory labneh recipes respectively.

I level during storage of probiotic flavoured fermented labneh recipes.

Storage period/days	Plain labneh(control)	Beet labneh	Carrot labneh	Chicory labneh
fresh	4.05	4.1	4.1	4.25
1	4	4.1	4.1	4.2
3	3.9	4	4.1	4.15
5	3.85	3.95	4	4.1
7	3.8	3.9	3.95	4.05
10	3.75	3.8	3.9	3.85

Table.(2): pH level during storage of probiotic flavoured fermented labneh recipes.

On the other hand, all treatments showed increasing acidity during storage (Fig.4). It reached 2.4; 2 ; 1.95 and 2.45 for the control, beet , carrot and chicory labneh recipes, respectively.Tendency of increased acidity as a result of labneh cultures growth agreed with the findings of Rohm *et al.,* 1990; Al-Kadamany *et al*., (2002) and Malak *et al.*,(2005).

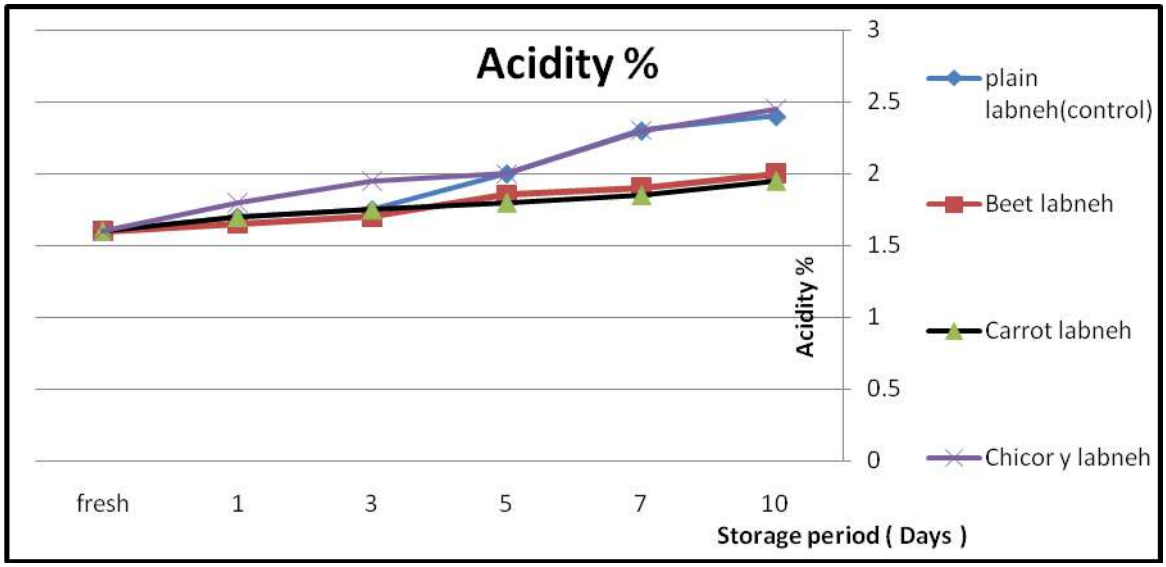

Figure (4): Acidity (%) during storage of probiotic flavoured fermented labneh recipes.

The proportion of free whey (Fig.5) increased upon storage in all treatments.Comparing with the plain labneh(control), the vegetables containing labneh exhibited lower degree of syneresis.Elongation the storage period and high rates of acid production have been reported to increase the degree of syneresis in cottage cheese (Schmidt and Bouma, 1992) and yogurt (Richmond et al., 1985).

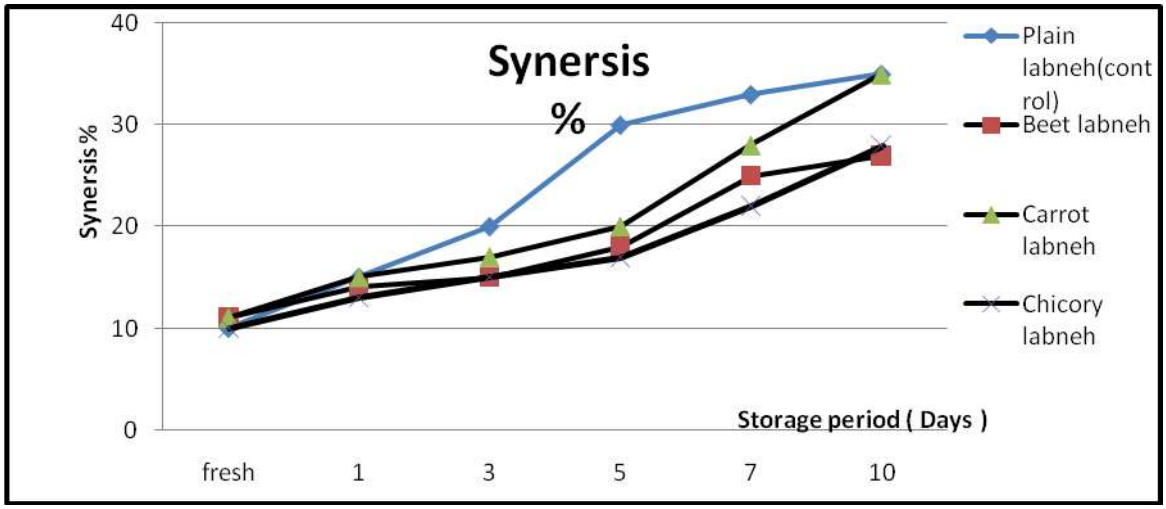

Figure (5): Synersis (%) of probiotic flavored fermented labneh recipes.

Microbiological properties of probiotic flavoured fermented labneh cheese based salads:

Lactic acid bacteria exhibited a substantial lag phase initially, with counts increasing thereafter and stabilizing towards the end of storage of all probiotic flavored fermented cheese based salads treatments including the control (Fig 6). Distinguished increase of lactic acid bacteria growth was traced for carrot and chicory labneh as comperd to the beet labneh and the control. The highest counts of lactic acid bacteria were observed when chicory and carrot were added. It seems that the carrot and chicory affected positively as a prebiotic on the lactic acid bacteria growth .The results of the present study are consistent in qualitative term with those reported by Bruno *et al.*, (2002); Martinez-Villaluenga et al. (2006); Martinez-Villaluenga & Gomez (2006) and El-Nemr & Hesham (2007) these authors reported significantly higher retention of viability when probiotic bacteria were grown in the presence of prebiotic compared with the control without prebiotic.

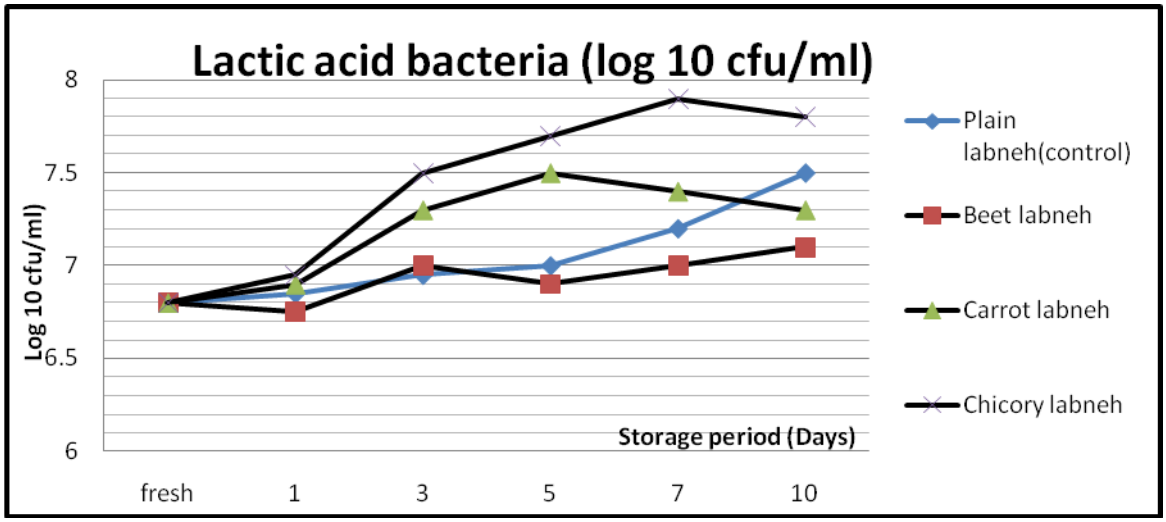

Figure (6): Lactic acid bacteria of probiotic flavored fermented labneh recipes.

Data in (Fig. 7) revealed that yeasts and moulds increased during storage period, with counts ranging from 3.1 to 4.5 (log10 cfu/ml). The pattern of change in yeasts and molds during storage of labneh is in accordance with earlier findings (El-Samargy *et al.*, 1988; Yamani and Abu-Jaber, 1994)

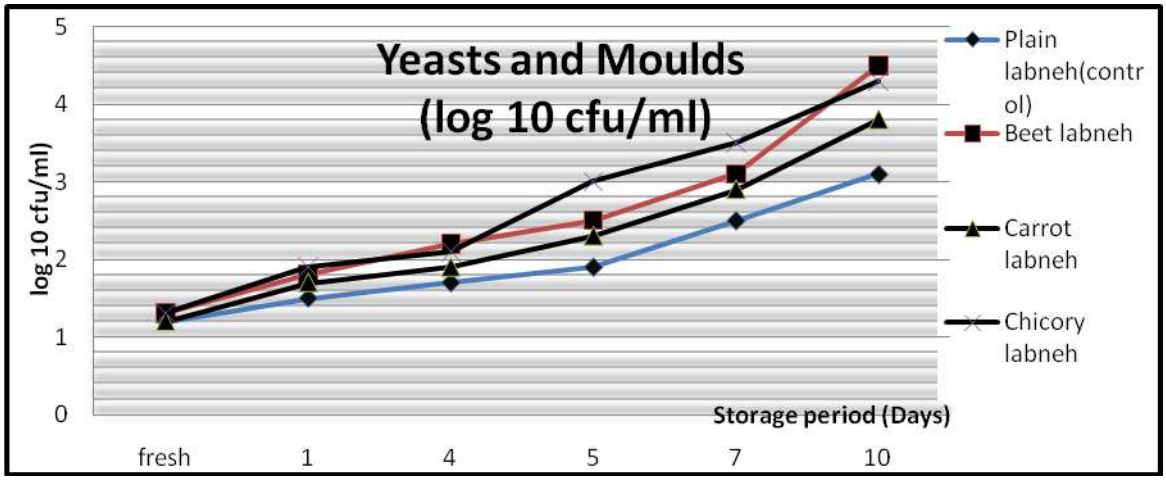

Figure (7): Yeasts and Moulds of probiotic flavored fermented labneh recipes.

Organoleptic properties:

Data concerning the sensory attributes of probiotic flavored fermented labneh cheese based salads are given in Table (3). Data exhibited that colour,taset,odour,texture and accepality of all recipes under investigation were significantly lower than the control. However,no significant difference was traced regarding the scores given by panelists for appearance,being the only exception among the quality attributes that have been subjectively judged. Accordingly,the total scores were significantly different. Recipes can be arranged in descening order as follows: Control, chicory , carrot and, beet labneh. Regarding the overall scores comparing with the plain labneh, Chicory labneh was more acceptable than beet and carrot labneh.On the other hand, chicory and carrot labneh were more acceptable in hotels restaurants wherease chicory and beet labneh were more acceptable in fast foods resturanst.

Table (3): Organoleptic evaluation of probiotic flavoured fermented labneh cheese based salads (mean ± S. D)

score / sample	Color	taste	Odor	texture	Appearance	Acceptability	Total Score
Plain labneh(control)	5^{a}	4.95^{a}	5.00^{a}	4.65^{a}	4.80^{a}	4.9^{a}	29.4^{a}
S.D	± 0.00	±0.22	±0.00	±0.49	±0.41	±0.31	±0.81
Carrot labneh	4.27^{c}	4.27^{c}	4.70^{b}	4.43^{b}	4.53^{a}	4.57^{b}	27.05^{c}
S.D	±0.58	±0.52	±0.47	±0.57	±0.57	±0.50	±1.47
Beet labneh	4.40^{c}	4.53^{b}	4.77^{b}	4.47^{b}	4.57^{a}	4.67^{b}	27.05^{c}
S.D	±0.67	±0.57	±0.43	±0.51	±0.57	±0.48	±1.32
Chicory labneh	4.70^{b}	4.57^{b}	4.86^{b}	4.50^{b}	4.70^{a}	4.77^{ab}	28.05^{b}
S.D	±0.47	±0.57	±0.36	±0.57	±0.53	±0.43	±1.47
L.S.D.	0.2637987408	0.2567243255	0.2436580535	0.2290313517	0.2888209647	0.2189664433	0.6759569139
significant	***	***	***	***	ns	**	***

N s non significant ** significant * High significant**

Mens in a column not sharing the same superscript are significantly different at p < 0.05

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الملخص العربى

تقديم خلطات جديدة من لبنة داعمة للحيوية ومنخفضة الدهن كسلطات منكهة طبيعيا فى وجبات الفنادق

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فى الآونة الأخيرة تزايد الطلب على الأغذية الوظيفية، وهو ما دفع المشتغلين بعلوم الأغذية لاستحداث وتقديم توليفات من الأغذية الصحية خاصة بمجال الفنادق والمطاعم ومنافذ بيع الأغذية السريعة .من هذا المنطلق فقد عنيت هذه الدراسة بتحضير جبن اللبنة الداعمة حيويا ومنخفضة المحتوى من الدهن وتم تحضيرها بإضافة 15 % من المستخلصات الطبيعية لبعض الخضراوات (البنجر الأحمر والجزر الأصفر و الشيكوريا) وهى أغذية لها قدرة طبيعية للتلوين وتحتوى على مواد نكهة ومحفزات حيوية وتضاد أكسدة. وقد تم تحليل هذه الخلطات كيماويا وميكروبيا بالإضافة إلى تقويمها حسيا وذلك بتقديمها فى الفنادق (5 نجوم و4 نجوم) وكذلك مطاعم الوجبات السريعة .ولقد أوضحت النتائج أن إضافة مستخلصي الجزر والشيكوريا للبنة قد أدى إلى زيادة حيوية بكتيريا حمض اللاكتيك بمعدل 2.8 – 8.8 % على الترتيب وذلك مقارنة بعينة اللبنة المرجعية (السادة). كذلك فقد تبين أن مستخلصات الخضراوات تحت الدراسة قد أدت إلى تقليل درجة التشريش بالعينات المختبرة وذلك مقارنة بالعينة المرجعية. من ناحية آخرى فقد تبين أن لبنة الشيكوريا كانت هىالأفضل من حيث التقبل الحسى مقارنة بكل من لبنة الجزر والبنجر وكذا العينة المرجعية . فى حين أن المحكمين فضلوا لبنة الشيكوريا والجزر التى تم تقديمها فى الفنادق ، أما فى مطاعم الوجبات السريعة فقد فضل المحكمون لبنة الشيكوريا والبنجر. وتجدر الإشارة إلى أن تقديم خلطات جديدة من لبنة داعمة حيويا يمثل مرونة كبيرة فى تنويع التقديم وكذلك للاختيارأمام العملاء بالفنادق والمطاعم ومنافذ بيع الوجبات السريعة.