

A STUDY ON COMPOSITION AND PROPERTIES OF CONCENTRATED YOGHURT (LABNEH) MANUF- ACTURED FROM RECOMBINED MILK WITH DIFFERENT VEGETABLE OILS II. THE MICROBIOLOGY EFFECT

SHAFIKA S. ABDEL-KADER AND SOAD A. IBRAHIM

Animal Production Research Institute, Agricultural Research Centre, Dokki, Giza,
Egypt.

(Manuscript received 21 January 1992)

Abstract

Labneh was made from filled milk with soya, palm, corn and sunflower oils and with anhydrous milk fat. For comparison labneh was prepared from cows and buffaloes milk. Resultant labneh was stored at $6 \pm 1^\circ\text{C}$ for 3 weeks, during this period microbial and chemical properties were estimated.

Results obtained showed that labneh with vegetable oils exhibited higher total viable, yeasts and mould counts than cows or buffaloes milk, particularly with palm oil, while coliform and sporeformers bacterial counts were higher with soya oil than other treatments. At the end of storage period, total viable coliform and sporeformers decreased, while storgoe lipolytic, yeasts and moulds increased. Labneh made from filled sunflower oil contained higher total viable, yeasts, and mould. milk with counts while that made by adding soya oil was higher in coliform and sporeformers counts. Addition of anhydrous milk fat contained higher lipolytic bacterial count than other treatments.

No appreciable differences were observed between different trials in moisture %, salt %, salt in moisture, pH and titratable acidity, either when fresh or during storage. Slightly lower moisture and slightly higher salt, salt in moisture and titratable acidity were recognized in labneh made from filled milk with sunflower oil than other treatments.

INTRODUCTION

The majority of fermented milk products (Yoghurt, Laben, kishk and some

fresh cheese varieties) had their origin in the Middle East. Milk from different species of mammals such as cow , goat , sheep and buffaloes is widely used for the manufacture of these products. Yoghurt and yoghurt related products are very popular in that region. Consequently, the science and technology of fermented milk production including the microbiology of starter culture and quality aspects have been studied and reviewed in detail (Rasic and Kurmann 1978, Tamime and Robinson 1985, 1988 and 1988b).

Cow or buffalo milk , full cream spray dried milk powder , recombined milk hydrolyzed or buttermilk used to milk yoghurt were used as raw materials to produce labneh (Tamime 1978 , Tamime and Robinson 1978, Rosenthal *et al.* 1980, Abdel - Salam and Alamy 1982 and El-Samargy *et al.* 1988 b).

From the sanitary aspects, some consumers prefer dairy products produced from filled milk. So, this study was planned to utilize skim milk powder with different vegetable oils to make labneh , and study the microbiological and chemical properties of it when fresh and during storage.

MATERIALS AND METHODS

Labneh was made from filled milk containing skim milk powder (A product of Holland) 1 : 8 and soybean oil (A product of Ambrosia oils Ltd . London) , corn oil (A product from Singapore) , sunflower (produced and packed in Portugal) palm oil (ortugal) , palm oil (produced by Misr and Foil processing Co., Attaka Suez palm oil). The vegetable oils were added at the rate of 3%. The filled milk samples were preheated to 60°C and homogenized at 200 kg/cm² . The prepared mixtures were heated to 60°C and homogenized at 200 kg / cm². The prepared mixtures were heated to 90°C for 15 min. cooled to 40°C and inoculated with yoghurt culture (*S. thermophilus*, *L. bulgaricus* 1 : 1) at the rate of 2 % . The incubation was carried out at 40±0.5°C until complete coagulation within 2-3 h. The coagulum was mixed thoroughly with sodium chloride (0.5% w/v) and put into cheese bags which were hung in refrigerator to allow whey drainage for 12 h. The labneh was filled in plastic containers and kept at 6±1°C for analysis. For comparison, labneh was also made from cow's (3.5 % fat) and buffaloes, milk (5.5 % fat) and from recombined milk by ad-

ding 3 % anhydrous milk fat. Samples were taken when fresh and at 1,2,3 weeks and analysed for total bacterial count using tryptone glucose extract agar (TGEA), and for coliform count using MacConkey agar medium as recommended by the American Public Health Association (APHA) (1978), and for yeast and mould counts using potato dextrose agar medium as described by Lodder and Van Rij (1952). Aerobic sporeformers count was determined according to method described by Charlmers (1962), and Lipolic bacteria were counted according to Berry (1933). Labneh samples were also analysed for moisture, titratable acidity and salt contents according to Ling (1963). The pH values were determined using pH meter. Average results of triplicates were recorded.

RESULTS AND DISCUSSION

Microbiological properties :

Results in Table 1 reveal that fresh labneh made from filled milk or recombined milk contained higher total viable count (TC) than that made from cow's or buffaloes' milk. On the other hand, labneh made with palm oil showed the highest TC, buffaloes, milk labneh appeared the lowest one when fresh. After storage the highest TC was observed in filled milk with corn oil and the lowest with soya oil. In all treatments there was gradual decrease in TC during storage.

Lipolytic bacterial counts (LBC) as shown in Table 1 were not detected in fresh labneh made either from buffaloes' milk or filled milk with sunflower oil.

Addition of corn or soya oil showed an increase in (LBC) in fresh labneh. At the end of storage period, (LBC) increased in all treatments especially by adding anhydrous milk fat.

From the data in the same table, it can be seen that among different trials, labneh with soya oil contained higher coliform bacterial counts, while cows' milk labneh showed the lowest ones. During storage, coliform decreased without appreciable differences between the treatments, while cows' labneh became free from coliform bacteria.

Sporeformers bacterial group exhibited higher count in fresh labneh with soya oil and lower count in buffaloes' milk labneh than the other treatments. Gradual

Table 1. Some microbial counts of Labneh made from filled milk with different oils.

Treatments	Storage Period (weeks)	Total bacterial count ($\times 10^6$)	Lipolytic b. (10^3)	Coliform count (10^1)	Spore former count (10^2)	Yeast mould (10^2)
Cow's milk	Fresh	48.45	11.0	12.0	31.0	10.0
	1	32.35	11.5	6.5	6.0	39.5
	2	25.75	20.5	6.5	6.0	50.0
	3	24.85	24.5	-	6.0	52.5
Buffalo's milk	Fresh	44.0	-	19.5	13.0	25.0
	1	35.4	-	13.0	5.0	31.0
	2	26.0	12.5	7.0	7.0	41.0
	3	25.0	19.0	6.5	6.0	62.5
Anhydrous milk fat	Fresh	60.95	9.0	25.0	26.0	5.5
	1	63.50	18.5	14.0	16.5	12.5
	2	46.00	30.0	13.0	11.0	15.0
	3	35.65	30.0	7.0	6.5	41.5
Corn oil	Fresh	80.0	11.5	28.5	23.0	33.5
	1	65.0	13.0	13.0	12.0	42.5
	2	63.0	17.0	8.0	10.5	56.0
	3	62.5	22.0	7.0	6.5	112.0
Soybean oil	Fresh	95.015	11.5	30.0	33.5	
	1	60.00	12.5	20.0	18.0	26.0
	2	25.55	20.5	12.0	15.0	55.5
	3	22.25	28.0	10.5	12.0	77.5
Palm oil	Fresh	28.7	5.5	15.0	18.0	10.6
	1	63.4	6.0	9.5	7.5	37.5
	2	47.5	6.0	6.0	6.5	42.5
	3	25.8	23.5	6.0	6.5	45.5
Sunflower oil	Fresh	98.0	-	28.5	24.0	61.0
	1	72.5	11.0	23.0	17.5	26.5
	2	39.8	11.5	13.0	17.0	37.0
	3	32.5	21.0	7.0	6.5	73.5

Table 2. Some chemical composition of Labneh made from filled milk with different oils.

Treatments	Storage Period (weeks)	Moisture %	Salt %	Salt / Water %	Acidity	pH
Cow's milk	Fresh	77.58	0.53	0.68	1.60	4.3
	1	77.38	0.75	0.96	2.05	4.1
	2	77.26	0.78	1.00	2.07	4.1
	3	77.00	0.82	1.06	2.15	4.0
Buffalo's milk	Fresh	76.76	0.84	1.09	1.25	4.65
	1	76.76	0.87	1.13	1.45	4.50
	2	76.33	0.89	1.16	1.50	4.45
	3	76.04	0.91	1.19	1.50	4.45
Anhydrous milk fat	Fresh	77.42	0.35	0.45	1.85	4.33
	1	76.51	0.40	0.52	1.91	4.20
	2	76.21	0.47	0.61	2.04	4.20
	3	76.00	0.50	0.65	2.08	4.20
Corn oil	Fresh	79.97	0.57	0.74	1.88	4.4
	1	76.64	0.62	0.80	1.95	4.3
	2	75.67	0.64	0.84	2.00	4.25
	3	75.41	0.67	0.82	2.03	4.25
Soybean oil	Fresh	78.32	0.20	0.25	1.50	4.5
	1	78.11	0.23	0.29	1.90	4.3
	2	78.01	0.23	0.29	1.95	4.3
	3	78.00	0.30	0.38	1.95	4.3
Palm oil	Fresh	78.57	0.47	0.59	1.85	4.35
	1	78.32	0.48	0.61	1.90	4.25
	2	78.27	0.50	0.63	1.92	4.20
	3	78.14	0.53	0.67	1.93	4.20
Sunflower oil	Fresh	74.55	0.93	1.24	2.00	4.2
	1	74.24	0.95	1.27	2.08	4.2
	2	73.90	0.98	1.32	2.08	4.2
	3	73.86	1.00	1.35	2.21	4.2

decrease was observed during storage without pronounced differences between treatments with the exception of stored labneh with soya oil which contained about the double count of all other treatments (Table 1).

Also, data given in Table 1 showed that the labneh with palm oil contained the highest yeast and mould counts, while anhydrous milk fat recombined milk labneh contained the lowest ones. Stored labneh showed an increase in Y & M counts in all treatments. The highest Y & M were detected in labneh made from filled milk with soya oil, but the lowest Y & M counts were observed in anhydrous milk fat recombined stored labneh.

2. Chemical properties :

Data given in Table 2 indicated that unpronounced differences were observed in moisture content of labneh made from different trials, with the exception of that made from filled milk with sunflower oil which contained lower moisture content than other treatments either when fresh or after 3 weeks of storage. In all treatments moisture content decreased gradually throughout storage.

Salt content and salt in moisture percentages showed an opposite trend of moisture content in labneh manufactured by different trials with the exception of that made with adding soya oil, which appeared lower in salt and salt in moisture than other treatments (Table 2). Also, as shown in Table 2 titratable acidity of labneh made from filled milk with sunflower oil was higher than the others, either when fresh or during storage. There was slight gradual increase in titratable acidity throughout storage with unpronounced differences between different trials. The pH values showed an opposite trend for that of acidity. No appreciable differences were observed between labneh obtained from different treatments.

REFERENCES

1. Abdel-Salam, M.H. and H.A. Alamy. 1982. Production and properties of yoghurt and concentrate yoghurt (Labneh) from ultrafiltered recombined milk. Res. Bull. Fac. Agric., Ain - Shams Univ. No. 1803, Cairo, Egypt.

2. American Public Health Association. 1978. Standard Methods for the Examination of Dairy Products. 14 th Ed. Am. Publ. Health Assoc. Inc., Washington, DC., U.S.A.
3. Berry , J. A. 1933. Studies of bacteriological flora and keeping quality of pasteurized liquid cream. J. Dairy Res., 15, 1947.
4. Chalmers C. H. 1962. Bacteria in relation to the milk supply. 4 th Ed. London.
5. El-Samargy, Y. A., M. A. Khorshid , N. S. Abd-Rabou and G. A. Mahran. 1988b. The utilization of butter milk in the production of yoghurt cheese (Labneh). Dairy and Food Sanitation , 8 (6) : 300 - 302.
6. Ling, E. R. 1963. A text book of dairy chemistry. Vol. 11, 3 rd Ed., Chapman and Hall Ltd., London.
7. Lodder, J. and N. J. W. Kreger, Van Rij. 1952. The yeast. A taxonomic study. North Holland Publishing Company, Amesterdam.
8. Rasic, J. L. and J. A. Kurmann. 1978. Yoghurt, Technical Dairy Puplishing House, Jyllingevej 39, DK - 2720 Vanlose, Copenhagen, Denmark.
9. Rosenthal, B. J. Juven and S. Gordin. 1980. Characteristics of concentrated yoghurt (Labneh) produced in Israel . J. Dairy Sci., 63 : 1826 - 1828.
10. Tamime, A. Y. and R. K. Robinson. 1985. Yoghurt science and technology, 1st Ed., Weaton and Co. Ltd., England .
11. Tamime, A.Y. and R. K. Robinson. 1988b. Technology and manufacture of therimophilic fermented milks, IDF Bulletin 227 , pp. 82-95, International Dairy Federation, Brussels, Belgium.
12. Tamime A. Y. and R. K. Robinson. 1988b. Fermented milks and their future trend, part II Technological aspects, J. Dairy Res., 55 : 281.
13. Tamime, A. Y. 1978. The production, of youghurt and concentrated yoghurt from hydrolyzed milk. Cult. Dairy Prod. J., 13 (3) : 16-21.
14. Tamime , A. Y. and R. K. Robinson. 1978 . Some a spectrs of a concentrated yoghurt (Labneh) popular in the Middle East. Milchwissenschaft, 33 : 209 - 212.

دراسة على تركيب وخواص اليوغورت المركز (اللبنه) المصنع من اللبن المعاد تركيبه والمحتوى على زيوت نباتية مختلفة

٢- التأثير الميكروبيولوجى

شفيقه السيد عبد القادر ، وسعاد عبد الفتاح ابراهيم

معهد بحوث الإنتاج الحيوانى - مركز البحوث الزراعية - الدقى - الجيزة

صنعت اللبنه من لبن فرز مجفف معاد تركيبه مع إضافة زيت الذرة ، زيت عباد الشمس
زيت فول الصويا وزيت النخيل كذلك دهن اللبن . كما صنعت عينات من لبن بقرى ولبن جاموسى
للمقارنة وحفظ الناتج على درجة حرارة $6 + 1$ م لمدة ٣ أسابيع قدرت خلالها بعض الخواص
الميكروبيولوجية عندما كانت طازجة وبعد ١ ، ٢ ، ٣ أسبوع .

ولقد اظهرت اللبنه المصنعة من اللبن الفرز المعاد تركيبه مع الزيوت النباتية ارتفاعاً
ملحوظاً فى كل من العدد الكلى والخمائر والفطريات خاصة عند إضافة زيت النخيل عن تلك المصنعة
من لبن بقرى أو جاموسى ، أما البكتريا المحللة للدهون ومجموعة بكتريا القولون والبكتريا
المتجرمة فقد كانت أعلى فى اللبنه المصنعة من اللبن الفرز المعاد تركيبه مع زيت فول الصويا عن
باقى المعاملات.

وبعد ثلاثة أسابيع من التخزين قل محتوى اللبنه فى جميع المعاملات من العدد الكلى
وبكتريا القولون والبكتريا المتجرمة بينما زادت اعداد كل من البكتريا المحللة للدهن والفطريات
بينما المصنعة بإضافة زيت الذرة بزيادة محتواها من العدد الكلى والخمائر والفطريات. ولقد تميزت
اللبنه المصنعه بإضافة زيت الذره بزيادة محتواها من العدد الكلى للخمائر والفطريات ، بينما
المصنعة بإضافة زيت فول الصويا زاد محتواها من بكتريا القولون والمتجرمة ، اما المصنعة
بإضافة دهن اللبن فقد ارتفع محتواها من البكتريا المحللة للدهن عن باقى المعاملات.

كما تشير النتائج الى أنه لم يكن هناك فروق ملحوظة فى النسب المئوية للرطوبة والملح فى
ماء الجبن ورقم الـ pH والحموضة فى لبنه المعاملات الطازجة والمخزنة وان كانت اللبنه المصنعة
بإضافة زيت عباد الشمس قد أظهرت إنخفاضاً قليلاً فى الرطوبة وارتفاعاً فى نسبة الملح والملح فى
الماء والجبن والحموضة عن باقى المعاملات.