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Impact of Olive Cake Supplementation on some Properties of Bio-Labneh Made from Goat's Milk

El-Metwally, R. I.*; M. Z. Eid and Monira M. Basiony

Dairy Technology Research Department, Animal Production Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.

ABSTRACT

The aim of this study was to investigate the effect of incorporation of olive cake (OC) on some properties of Labneh made from goat's milk using ABT-5 culture. Three rates of OC (0.25, 0.50 and 1 %) were added to both goat's milk and Labneh paste. Labneh was stored for 28 days at 5°C and samples were taken and analysed at 7 days intervals. Adding OC increased pH, total solids, fat , salt, total protein, total phenol, dietary fibers, total antioxidant activity and total volatile fatty acids values. On contrary, titratable acidity, water soluble nitrogen, and total bacterial count, lactic acid bacteria and bifidobacteria contents slightly decreased. Sensory evolution scores revealed that the Labneh fortified with 0.25 and 0.50% OC (added to milk or paste) was acceptable during the storage period. Adding OC depress production cost of Labneh. Thus, diverse nutritional and economic benefits can be acquired.

Keywords: Labneh, ABT, bifidobacteria, olive cake, chemical properties, organoleptic properties.

INTRODUCTION

Labneh is an acidified common dairy product in the Middle East, especially in Syria and Lebanon (Tamime, 2003). It is semi solid food obtained from yoghurt by removing part of its water and water-soluble compounds. Labneh has a smooth and pasty texture with semi-solid mass, a taste passing among sour cream and cottage cheese and a distinctive intense flavour that is largely modulated by diacetyl produced through fermentation (Tamime and Robinson, 1999). Labneh is the proper matrix for probiotics due to its high total solids content, which would reserve protection when added to them (Gün and Işıklı, 2007). The consumption of probiotic products has promoted noticeably degree in most European, Asia-Pacific and American countries, and the majority products comprising *L. acidophilus*, or bifidobacteria or both are available in the market worldwide (Parmar 2003).

On the other side, the use of agro-industrial by-products has taken on considerable importance for solving the problem of the elimination of waste material and lowering production costs. In the Mediterranean area, the olive and olive oil industries played grand social and economic role (Molina and Nefzaoui, 1996). This industry creates worthy amounts of by-products and one of the most dominant is olive cake (OC) which rated a cheap by-product of olive oil industry. It is attained after the extraction of oil from olives and includes of skin, pulp, stone and water.

Olive cake is considered a rich source of phenolic compounds with a vast array of biological activities (Rodis *et al.*, 2002).

three aspects of antioxidant activity have been estimated in olive cakes; antioxidant potency, anti-radical activities and radical scavenging activities (Shahidi and Naczk, 2004). So the purpose of current study was to study the Effect of olive cake supplementation on some properties of bio -Labneh made from goat's milk.

MATERIALS AND METHODS

Fresh goat's milk (acidity 0.16%, pH 6.63, fat 4.7, TS 13.08 and TP 3.51%) was obtained from El-Serw Animal Production Research Station, Animal Production Research Institute, Agricultural Research Center, Egypt. ABT culture (ABT-5) with mixed strains of *S. thermophilus* (as a sole fermenting organism) and LA + *B. bifidum* (as probiotic organisms) (Chr. Hansen's Lab A/S Copenhagen, Denmark) was used. Starter culture was in freeze-dried direct-to-vat set form. After procurement, the starter cultures were stored at –18°C in the absence of atmospheric air. The olive cake was collected from a local olive processing factory at Damietta Governorate, Egypt. The chemical composition of the tested OC are shown in Table (1).

Table 1. Chemical composition of OC.

Chemical composition g/100g	
Fat	9.52
Protein	7.36
Ash	5.84
Carbohydrates	31.68
Fiber	39.29
Phenolic content*	394.57
Antioxidant activity**	2.86

***Data expressed as mg gallic acid equivalent (GAE)/ 100 g dry weight.**
****Data expressed as µmol Trolox equivalent (TE)/g dry weight.**

Labneh making:

Labneh was made by the method as described by (El-Samergy *et al.,*1988).

* **Corresponding author.**
E-mail address: raidxp@yahoo.com
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The Labneh treatments were split into seven batches as follow:

Treatment A: Labneh made from goat's milk (control).
Treatment B: Labneh made from goat's milk contained 0.25 % OC.
Treatment C: Labneh made from goat's milk contained 0.50 % OC.
Treatment D: Labneh made from goat's milk contained 1.00 % OC.
Treatment E: Labneh paste fortified with 0.25 % OC.
Treatment F: Labneh paste fortified with 0.5 % OC.
Treatment G: Labneh paste fortified with 1.0 % OC.

For all treatments goat's milk was heated to 90°C for 10 min., at 75°C, 0.25, 0.50 and 1.00% OC were added for treatments B, C and D respectively. milk was cooled to 40°C, Different samples were inoculated with ABT-5 culture (2%) and incubated at 40°C for fully coagulation. The produced yoghurt was mingled with 3% salt and put into cloth bags which were hung for one day in a refrigerator to allow whey drainage. For samples E, F and G, 0.25, 0.50 and 1.00% OC were mixed with Labneh past respectively. Finally, the Labneh transferred to 250g plastic cups, covered with polyethylene film and stored at 5°C for 28 days. Labneh samples were analyzed when fresh and after 0, 7, 14, 21 and 28 days of refrigerated storage. Three replicates of each treatment were conducted.

Total solids, fat and TN contents of samples were determined according to (AOAC, 2000). Titratable acidity was evaluated according to (Richardson, 1986). The pH values were measured using a digital laboratory pH meter with a glass electrode model SA 720 (Orion, U.S.A). Water-soluble nitrogen (WSN) was evaluated according to Ling (1963). Total volatile fatty acids (TVFA) were determined according to Kosikowiski (1978). Salt contents of ingredients were evaluated using the Volhard method according to Richardson (1985). The method of Zheng and Wang (2001) was followed in determining the total phenol compounds using Folin Ciocalteu Reagent (FCR) and gallic acid as a standard solution. The antioxidant activity (AA%) of the olive cake was determined as described by Lee, *et al.,* (1995).

Labneh samples were analyzed for the total viable bacterial count (TVBC), lactic acid bacteria, moulds and yeast counts according to the American Public Health Association (1994). The count of bifidobacteria was evaluated according to Dinakar and Mistry (1994).

Samples of Labneh were organoleptically scored by the staff of the El-Serw Animal Production Research Station. The score points were 50 for flavour, 35 for body and texture and 15 for colour and appearance, which give a total score of 100 points.

The results were statistically analyzed using a software package (SAS, 1991) based on analysis of variance. When F-test was a significant, the least significant difference (LSD) was calculated according to Duncan (1955) for the comparison between means. The data presented in the tables are the mean (± standard deviation) of 3 experiments.

RESULTS AND DISCUSSION

Data presented in Table (2) shows the development of acidity (as lactic acid percentages) of goat's milk inoculated with ABT-5 culture as an indicator for the effect of adding OC to goat's milk on starter activity. Within 180 minutes, changes in acidity were observed. The addition of different concentration of OC to milk led to a slight increase in titratable acidity at zero time but the rates of acidity development were slightly slower in these samples compared with control. Adding fibers to milk did not affect the fermentation time to reach pH 4.6 (Sharma, 2011). The changes in total acidity are major factor, it affects the shelf life and the acceptability of Labneh. (Abd-Allah *et al*., 1993).

Table 2. Effect of adding Olive Cake to goat's milk on starter activity (clarified as acidity percentage)

Treatments	Incubation time (min)						
	0	30	60	90	120	150	180
Control	0.23	0.25	0.28	0.32	0.40	0.47	0.62
0.25 % OC	0.24	0.27	0.30	0.33	0.39	0.44	0.57
0.50 % OC	0.25	0.29	0.31	0.33	0.38	0.42	0.54
1.0 % OC	0.26	0.30	0.32	0.34	0.37	0.41	0.52

Data recorded in Table (3) illustrated the effect of adding OC on coagulation time, curd tension and curd syneresis of goat's milk coagulated by ABT5 starter. It is obvious that the addition of OC doesn't have a significant effect on starter coagulation time. Results in this table also clear that the curd tension rate increase with the increase of the concentration of added OC, on contrary, the syneresis values decreased with the increase of OC concentration. olive cake is plenty in crude fiber and carbohydrates and contains passable ratio of crude protein, fat and ash (Al hamad *et al,* 2002). In all treatments, syneresis increased during the incubation time. The rate of increase in curd syneresis was slightly greater during the first 30 minutes of incubation time. The syneresis declined due to increased water holding of fiber that absorbed the whey liberated by the gel structure (Garcia-Perez *et al.,* 2005).

Table 4 refers to the effect of adding OC to goat's milk on yield and some chemical properties of Labneh. The highest yield (29.97%) was obtained in treatment (G) with added 1% OC to Labneh paste. It could be seen that the addition of different concentrations of OC to goat's milk or Labneh paste increased yield values. From the present Table, it could be seen that the acidity values of control Labneh were higher than those made containing OC. The results shows that the Labneh acidity declined as the level of OC increased. Also, the acidity values were progressively increased significantly ($P < 0.001$) during storage for up to 28 days. pH values have the opposite trend of acidity. These results are in consent with those reported by Ismail *et al.,* (2016) who noted that the Labneh acidity decreased as the level of olive leaves increased. raise of the acidity and decease of the pH values may be due to the fermentation of lactose to lactic acid. like

results were found by Salem *et al.,* (2013). Abbas and Osman (1998) cleared that the acidity increased progressively during storage period of Labneh. Table 4 also cleared that total solids increased with increasing OC concentration and increased in all treatments during the storage period which could be due to moisture loss (Al. Otaibi and El. Demerdash, 2008).

Also fat, fat/DM, salt and salt in moisture results revealed that their values increased significantly ($P < 0.001$) during the storage period and also increased by increasing OC concentration. Olive cake categorized by a good oil percentage, approximately 18–25% in the crude olive cake, which declares a good energetic supplement, and by a high level of oleic acid which is interesting in human feeding for its beneficial effects on blood cholesterol and other health related outcomes (Chiofalo *et al.,* 2002).

Table 3. Effect of adding Olive Cake on coagulation time, curd tension and curd syneresis of goat's milk coagulated by ABT5 starter.

Treatments	Starter Coagulation time (hrs)	Curd tension (g)	Curd syneresis (gm/15 gm of curd)* Time (min)			
			10	30	60	120
control	3.00[a]	29.44[c]	3.311[b]	3.981[b]	5.867[b]	6.584[b]
0.25 %OC	3.10[a]	30.68[b]	3.108[c]	3.877[c]	5.712[c]	6.326[c]
0.50 %OC	3.15[a]	31.21[a]	3.024[d]	3.862[d]	5.365[d]	6.122[d]
1.0 % OC	3.25[a]	28.37[d]	3.335[a]	4.052[a]	5.923[a]	6.664[a]
LSD	0.485***	0.0298***	0.003***	0.003***	0.003***	0.0032***

Significant different at p < (*0.05, **0.01, ***0.001). For each effect the different letters in the means the multiple comparisons are different from each. Letters a is the highest means followed by b, c …..etc
***Whey excluded (grams) from 15 gm of curd kept at room temperature after 10, 30, 60 and 120min.**
OC= Olive Cake

Table 4. Effect of adding Olive Cake to goat's milk on yield and some chemical properties of Labneh.

Treatments	Storage period (days)	Yield %	Acidity %	pH values	TS %	Fat %	Fat/ DM%	Salt %	Salt in moisture
	0		1.44	5.54	26.57	10.67	40.15	0.97	1.30
	7		1.46	5.52	26.75	10.85	40.56	1.01	1.36
A	14	29.08	1.52	5.10	26.93	11.08	41.14	1.05	1.41
	21		1.66	4.71	27.24	11.23	41.22	1.12	1.52
	28		1.75	4.65	27.50	11.35	41.27	1.18	1.60
	0		1.40	5.55	26.66	10.71	40.17	1.13	1.52
	7		1.44	5.32	26.89	10.87	40.42	1.18	1.58
B	14	29.36	1.52	4.98	27.05	11.11	41.07	1.24	1.67
	21		1.65	4.74	27.39	11.28	41.18	1.30	1.75
	28		1.73	4.72	27.62	11.40	41.27	1.36	1.84
	0		1.36	5.65	26.82	10.79	40.23	1.23	1.65
	7		1.42	5.52	26.89	10.96	40.62	1.27	1.70
C	14	29.54	1.50	4.99	27.18	11.21	41.24	1.33	1.79
	21		1.62	4.88	27.50	11.39	41.41	1.40	1.89
	28		1.70	4.76	27.75	11.52	41.51	1.45	1.96
	0		1.30	5.78	26.95	10.92	40.51	1.27	1.70
	7		1.35	5.33	27.14	11.08	40.82	1.32	1.77
D	14	29.85	1.44	5.53	27.37	11.28	41.21	1.38	1.86
	21		1.51	5.14	27.68	11.48	41.47	1.44	1.95
	28		1.60	4.93	27.94	11.66	41.73	1.51	2.05
	0		1.39	5.58	26.68	10.72	40.17	1.14	1.53
	7		1.43	5.56	26.90	10.89	40.48	1.19	1.60
E	14	29.63	1.52	5.12	27.05	11.13	41.14	1.26	1.69
	21		1.65	4.76	27.41	11.29	41.18	1.31	1.77
	28		1.74	4.66	27.63	11.42	41.33	1.38	1.87
	0		1.37	5.63	26.84	10.81	40.27	1.25	1.67
	7		1.43	5.56	26.99	10.97	40.64	1.28	1.72
F	14	29.81	1.51	5.14	27.20	11.22	41.25	1.36	1.83
	21		1.64	4.77	27.51	11.39	41.40	1.42	1.92
	28		1.71	4.72	27.77	11.53	41.21	1.47	1.99
	0		1.30	5.78	26.98	10.94	40.54	1.28	1.72
	7		1.36	5.35	27.15	11.09	40.84	1.33	1.79
G	14	29.97	1.44	5.53	27.38	11.30	41.27	1.40	1.89
	21		1.53	5.11	27.70	11.51	41.55	1.46	1.97
	28		1.62	4.89	27.95	11.68	41.78	1.52	2.06

Treatment A: Labneh made from goat's milk (control)
Treatment B: Labneh made from goat's milk contained 0.25 % OC
Treatment C: Labneh made from goat's milk contained 0.50 % OC
Treatment D: Labneh made from goat's milk contained 1.00 % OC
Treatment E: Labneh paste fortified with 0.25 % OC
Treatment F: Labneh paste fortified with 0.5 % OC
Treatment G: Labneh paste fortified with 1.0 % OC

Table 5 shows that the TN and TN/DM values of Labneh contained OC were higher than the control.

In the contrast, WSN and WSN/TN decreased by increasing the ratios of OC but increased during the storage.

Olive cake contains humble amounts of crude protein, fat and ash (Obeid *et al.,* 2012). Adding OC to Labneh increased TVFA values. Treatments D and G have higher values comparing with control.

Generally, TN, WSN, WSN/TN and TVFA values of all Labneh treatments gradually increased significantly ($P < 0.001$) during the storage period.

Table 5. Effect of adding Olive Cake to goat's milk on protein fractions and TVFA contents of labneh.

Storage period (days)	A	B	C	D	E	F	G
				TN %			
0	1.38	1.42	1.49	1.63	1.43	1.50	1.65
7	1.49	1.53	1.61	1.77	1.55	1.63	1.78
14	1.61	1.68	1.80	1.95	1.69	1.84	1.97
21	1.74	1.81	1.93	2.12	1.83	1.94	2.13
28	1.85	1.94	2.11	2.29	1.96	2.13	2.30
				TN/DM %			
0	5.19	5.32	5.55	6.04	5.35	5.58	6.11
7	5.57	5.68	5.96	6.52	5.76	6.04	6.55
14	5.97	6.21	6.62	7.12	6.24	6.76	7.19
21	6.38	6.60	7.01	7.65	6.67	7.05	7.68
28	6.72	7.02	7.60	8.19	7.09	7.67	8.22
				WSN %			
0	0.327	0.324	0.317	0.310	0.322	0.316	0.310
7	0.360	0.355	0.348	0.342	0.353	0.347	0.340
14	0.411	0.410	0.404	0.398	0.410	0.402	0.397
21	0.457	0.453	0.447	0.438	0.451	0.444	0.436
28	0.464	0.462	0.457	0.455	0.460	0.455	0.454
				WSN/TN %			
0	23.69	22.81	21.27	19.10	22.51	21.06	18.78
7	24.16	23.20	21.61	19.32	22.77	21.28	19.10
14	25.52	24.40	22.44	20.41	24.26	21.84	20.15
21	26.26	25.02	23.16	20.66	24.64	22.88	20.46
28	25.08	23.81	21.66	19.86	23.46	21.36	19.73
				TVFA*			
0	9.87	9.94	10.04	10.17	9.96	10.05	10.19
7	10.98	11.05	11.12	11.24	11.08	11.14	11.25
14	12.11	12.15	12.21	12.33	12.18	12.22	12.36
21	13.67	13.70	13.74	13.85	13.72	13.76	13.86
28	14.95	14.97	14.99	15.14	14.99	14.99	15.15

***expressed as ml 0.1 NaOH 100 g-1 cheese**

As shown in Table 6, the total count and lactic acid bacteria of treatments containing OC were lower than that of control. The reduction in the number of bacteria may be caused by high viscosity and lack of water activity. On the contrary, bifidobacteria populations raised in OC samples.

As a general in all Labneh treatments, the counts of various microbial groups decreased significantly ($P < 0.001$) within storage period. This decrease may be due to the high microbial fermentation induced acidity.

Dave and Shah, (1997) noted that decrease in the counts of the different microorganisms might be attributed to the rise acidity produced by microbial fermentation.

Moreover, it could be observed also that moulds and yeasts, as well as coliform bacteria, were absent except at 14 days of storage, little numbers of yeasts and fungi appeared. This may be due to the hygiene conditions adapted during manufacture and storage.

The probiotic bacteria counts during storage recorded above 10^6 cfu.g^{-1} in all Labneh samples, This means that the viability of strains after the storage period was sufficient to critical dose of beneficial organisms that were higher than the accepted threshold (10^6 cfu.g^{-1}) for a probiotic effect (Gomes and Malcata, 1998).

Data presented in Table 7 show that control labneh had the lowest value of phenolic content compared to all olive cake labneh treatments. like results have previously been reported for antioxidant activity. Noticed that adding olive cake to labneh increased significantly ($P < 0.001$) total antioxidant activity compared to control (Table, 9). In addition , the increasing of antioxidant ability for supplemented labneh might be due to the phenolic content and antioxidant activity in olive cake (Table, 1). These results in agreement with Moudache *et al*., (2021) who cleared that olive cake and leafs extracts have several interesting phenolic compounds and antioxidants. Shahidi and Naczk, (2004) noted that three aspects of antioxidant activity have been evaluated in olive cakes; antioxidant potency , anti-radical activities and radical scavenging activities.

From the presented data at Table 7, it could be noticed that adding olive cake to labneh was accompanied by high levels of Dietary fibers, and that might be as a result to the higher dietary fiber content of olive cake.

These results were similar to those reported by Molina and Yañez (2008) who reported that the olive cake is characterized by a low crude protein content (<10% of DM), a high crude fiber content (up to 50% of DM), And Heuzé *et al.,*(2014) who noted that olive cake contains high amounts of crude fiber (383 g/kg).

Table 6. Effect of adding Olive Cake to goat's milk on some microbial groups (log cfu/ml) of labneh

Storage period (days)	Total Bacterial Count (x 10^6)						
	A	B	C	D	E	F	G
0	132	122	114	104	124	115	105
7	125	108	103	91	110	105	92
14	113	98	93	80	95	92	81
21	102	89	84	73	88	84	74
28	98	85	77	65	84	78	66
	Lactic acid bacteria (x 10^6)						
0	117	112	104	91	113	105	92
7	108	101	95	80	102	97	82
14	98	92	85	70	94	86	71
21	90	86	79	62	88	80	63
28	86	80	72	57	82	74	56
	Bifidobacteria (x 10^5)						
0	26	٣٧	34	31	35	33	31
7	24	32	28	26	30	28	25
14	17	26	23	21	25	22	20
21	10	19	16	13	19	14	11
28	6	15	12	9	14	11	8
	Moulds & Yeast (x 10^3)						
0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
14	6	4	2	1	5	2	2
21	10	7	6	4	8	6	4
28	15	11	10	9	12	10	9

The fiber coats the bile acids in the intestine and is excreted in the body, subsequently causing the body to pull cholesterol from the blood to form bile acids, and thus lowering blood cholesterol level (Yukio and Tatsuro, 2011).

The scores of organoleptic properties of Labneh made with OC during storage at 5c for 28 days are presented in table (8).

The addition of OC to goat's milk or directly to Labneh paste led to slightly decrease in colour and appearance but it improved the body and texture in all treatments .

Treatment E gained highest score of sensory evaluation followed by treatment F, while treatment D gave the lowest score for fresh Labneh and during the storage period.

Biagina *et al.,* (2020) cleared that cheese made from milk of animals fed with olive cake showed the highest scores of acceptance.

Table7. Effect of adding olive cake to goat's milk on phenolic content , total antioxidant activity and dietary fibers of fresh labneh at zero time.

Treatments	Phenolic content*	Total antioxidant activity**	Dietary fibers%
A	0.61^{d}	0.10^{e}	---
B	0.93^{c}	0.22^{d}	0.42^{d}
C	1.04^{b}	0.29^{cd}	0.50^{bc}
D	1.13^{a}	0.38^{ab}	0.65^{a}
E	0.94^{c}	0.24^{cd}	0.45^{cd}
F	1.05^{b}	0.31^{bc}	0.52^{b}
G	1.14^{a}	0.40^{a}	0.68^{a}
LSD	0.023***	0.077***	0.067***

***Data expressed as mg gallic acid equivalent (GAE)/g dry weight.**
****Data expressed as µmol Trolox equivalent (TE)/g dry weight.**

Table 8. Effect of adding Olive Cake to goat's milk on organoleptic properties of labneh.

Treatments	Storage Period (days)	Color & Appearance (15)	Body & Texture (35)	Flavour (50)	Total (100)
A	0	14	30	45	89
	7	13	32	46	91
	14	13	31	46	90
	21	12	31	44	87
	28	11	30	44	85
B	0	12	31	47	89
	7	12	32	47	91
	14	12	31	46	89
	21	11	31	46	88
	28	11	30	45	86
C	0	11	32	46	89
	7	11	31	45	87
	14	10	31	44	85
	21	10	30	41	81
	28	10	30	40	80
D	0	10	33	37	80
	7	١0	32	36	78
	14	10	32	36	78
	21	10	31	35	76
	28	9	30	34	73
E	0	13	32	47	92
	7	13	32	47	92
	14	12	31	46	89
	21	12	31	45	88
	28	11	30	44	85
F	0	12	33	46	91
	7	12	32	46	90
	14	12	31	45	88
	21	11	30	45	86
	28	11	30	44	85
G	0	11	33	38	82
	7	10	33	37	80
	14	10	32	36	78
	21	9	31	34	74
	28	9	30	33	72

Table 9. Statistical analysis of cheese treatments

Analysis	Effect of cheese treatments							
	A	B	C	D	E	F	G	LSD
Yield	29.08^{g}	29.36^{f}	29.54^{e}	29.85^{b}	29.63^{d}	29.81^{c}	29.97^{a}	0.027***
Acidity	1.56^{a}	1.54^{ab}	1.52^{b}	1.44^{c}	1.54^{ab}	1.53^{ab}	1.56^{a}	0.035***
pH	5.10^{d}	5.06^{e}	5.16^{b}	5.34^{a}	5.12^{c}	5.16^{b}	5.33^{a}	0.018***
TS	26.99^{d}	27.12^{c}	27.24^{b}	27.41^{a}	27.13^{c}	27.26^{b}	27.42^{a}	0.027***
Fat	11.03^{e}	11.07^{d}	11.13^{c}	11.28^{b}	11.09^{d}	11.18^{c}	11.31^{a}	0.017***
Salt	1.06^{d}	1.24^{c}	1.33^{b}	1.38^{a}	1.25^{c}	1.35^{b}	1.39^{a}	0.022***
Salt in moisture	1.43^{d}	1.67^{c}	1.8^{b}	1.86^{a}	1.69^{c}	1.82^{b}	1.86^{a}	0.037***
TN	1.61^{d}	1.67^{c}	1.82^{b}	1.95^{a}	1.69^{c}	1.81^{b}	1.96^{a}	0.032***
WSN	0.404^{a}	0.401^{b}	0.394^{c}	0.388^{d}	0.399^{b}	0.392^{c}	0.387^{d}	0.003***
TVFA	12.32^{f}	12.36^{e}	12.42^{c}	12.55^{b}	12.38^{d}	12.42^{c}	12.56^{a}	0.018***
Total Phenol	0.61^{d}	0.93^{c}	1.04^{b}	1.13^{a}	0.94^{c}	1.05^{b}	1.14^{a}	0.026***
TVBC	114^{a}	100.45^{b}	94.2^{c}	82.6^{d}	100.2^{b}	94.86^{c}	83.73^{d}	1.25***
Lactic acid bac.	99.8^{a}	94.33^{c}	87^{e}	72^{f}	95.8^{b}	88.4^{d}	72.8^{f}	0.966***
Bifido.	16.6^{g}	25.8^{a}	22.6^{c}	20^{e}	24.6^{b}	21.6^{d}	19^{f}	0.758***
Moulds & Yeast	6.2^{a}	4.4^{c}	3.6^{d}	2.8^{e}	5^{b}	3.6^{d}	3^{e}	0.555***
Color	12.6^{a}	11.6^{b}	10.4^{c}	9.8^{c}	12.2^{ab}	11.6^{b}	9.8^{c}	0.728***
Body	30.86^{c}	31.06^{bc}	30.86^{c}	31.6^{ab}	31.2^{abc}	31.2^{abc}	31.8^{a}	0.685***
Flavor	45^{c}	46.2^{a}	43.2^{d}	35.6^{e}	45.8^{b}	45.2^{bc}	35.6^{e}	0.728***
Phenolic content	0.61^{d}	0.93^{c}	1.04^{b}	1.13^{a}	0.94^{c}	1.05^{b}	1.14^{a}	0.026***
Total antioxidant	0.10^{e}	0.22^{d}	0.29^{cd}	0.38^{ab}	0.24^{cd}	0.31^{bc}	0.40^{a}	0.077***
Dietary fibers%	0^{e}	0.42^{d}	0.50^{bc}	0.65^{a}	0.45^{cd}	0.52^{b}	0.68^{a}	0.067***
	Effect of storage time (days)							
	0	7	14	21	28	LSD		
Acidity	1.36^{e}	1.41^{d}	1.49^{c}	1.61^{b}	1.69^{a}	0.029***		
pH	5.64^{a}	5.45^{b}	5.19^{c}	4.86^{d}	4.76^{e}	0.015***		
TS	26.78^{e}	26.97^{d}	27.16^{c}	27.49^{b}	27.73^{a}	0.023***		
Fat	10.79^{e}	10.96^{d}	11.19^{c}	11.36^{b}	11.51^{a}	0.015***		
Salt	1.18^{e}	1.22^{d}	1.29^{c}	1.35^{b}	1.41^{a}	0.019***		
Salt in moisture	1.57^{e}	1.64^{d}	1.72^{c}	1.82^{b}	1.91^{a}	0.031***		
TN	1.52^{e}	1.62^{d}	1.79^{c}	1.93^{b}	2.08^{a}	0.027***		
WSN	0.318^{e}	0.349^{d}	0.404^{c}	0.446^{b}	0.458^{a}	0.003***		
TVFA	10.03^{e}	11.12^{d}	12.22^{c}	13.76^{b}	15.03^{a}	0.015***		
TVBC	116.66^{a}	104.85^{b}	93.19^{c}	84.9^{d}	79^{e}	1.055***		
Lactic acid bac.	104.94^{a}	95.05^{b}	85.14^{c}	78.28^{d}	72.43^{e}	0.817***		
Bifido.	32.43^{a}	27.57^{b}	22^{c}	14.57^{d}	10.71^{e}	0.641***		
Moulds & Yeast	0^{d}	0^{d}	3.19^{c}	6.42^{b}	10.85^{a}	0.469***		
Color	11.86^{a}	11.57^{a}	11.28^{ab}	10.71^{bc}	10.28^{c}	0.615***		
Body	32^{a}	32^{a}	31.38^{b}	30.76^{c}	30^{d}	0.579***		
Flavor	43.71^{a}	43.43^{a}	42.71^{b}	41.42^{c}	40.57^{d}	0.615***		

CONCLUSION

The results of the current study illustrated that the addition of olive cake to bio Labneh improved the physiochemical, microbiological and sensory properties.

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تأثير التدعيم بتفل الزيتون على خواص اللبنة الحيوية المصنعة من لبن الماعز

رائد إبراهيم المتولى، محمد زكى عيد و منيرة محمود بسيونى

قسم بحوث تكنولوجيا الألبان- معهد بحوث الإنتاج الحيواني- مركز البحوث الزراعية

تهدف هذه الدراسة إلى التعرف على الخواص الكيميائية والميكروبيولوجية والحسية للبنة المصنعة من لبن ماعز باستخدام بادىء ال ABT-5 و المدعمة بتفل الزيتون. حيث تم تصنيع معاملة مقارنة وستة معاملات من اللبنة، ثلاثة منهم تمت إضافة تفل الزيتون بنسبة 0.25، 0.5، ١% إلى لبن الماعز و ثلاثة تمت إضافة تفل الزيتون بنفس النسب إلى عجينة اللبنة والخلط جيدا والتخزين لمدة ٢٨ يوم على درجة ٥°م وإجراء الإختبارات المطلوبة إسبوعيا. و قد أشارت النتائج إلي أن إضافة تفل الزيتون أدى إلى زيادة التصافى و pH و المواد الصلبة والدهن والملح والبروتين والأحماض الدهنية الطيارة و الفينولات وكذلك مضادات الاكسدة. وأوضحت النتائج أيضا أن المعاملات المحتوية على تفل الزيتون إنخفضت بها أعداد البكتيريا الكلية وبكتيريا حمض اللاكتيك وكذلك الخمائر والفطريات في حين زادت بها بكتيريا البيفيدو مقارنة بعينة المقارنة . و قد أدت إضافة تفل الزيتون إلى تحسين الخواص الحسية للبنة المصنعة من لبن الماعز وكانت أفضل نتائج للتقييم الحسي هى معاملات اللبنة المضاف لها ٠,٢٥ % من تفل الزيتون.