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EFFECT OF DIFFERENT CONCENTRATIONS OF PEACH, CHERRY, AND KIWI MARMALADE ON SOME PHYSICOCHEMICAL PROPERTIES OF FRUIT YOGHURT DURING STORAGE

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ABSTRACT

Different concentrations (7 and 10%) of cherry, peach and kiwi marmalade was added to plain yogurt and physicochemical properties of yoghurt samples such as protein, fat, moisture, carbohydrate and ash were determined at first days of production. Also syneresis, acidity, pH, water holding capacity (WHC) and sensory properties were measured during 1st , 6th and 10th days of storage. Statistically significantly differences were shown between plane yogurt and fruit yogurt in the ash, pH, protein, moisture, carbohydrate content and titratable acidity in first day of production. Addition of marmalade increased ash, protein and carbohydrate content while decreased oil content of yogurt. The results revealed that acidity increased over the storage time. Addition of marmalade increased WHC and decreased the syneresis in whole of storage period. Results of sensory evaluation showed that there were significant differences among the yoghurt samples. The yoghurt containing kiwi had the lowest overall acceptability scores as compare to other fruit yogurt samples.

Key word: Fruit yoghurt, Sensory quality, Syneresis.

INTRODUCTION

The presence of yoghurt in the diet has been shown to induce effective health benefits linked to the presence of useful bacteria. Yoghurt containing different bacteria (*Lactobacillus delbrueckii* ssp. *bulgaricus* and *Streptococcus thermophilus*) increase lactose digestion and decrease symptoms of lactose intolerance, also yoghurt is found to be more suitably tolerated by lactose maldigesters. In many countries, yogurt is still produced using traditional procedures. At present, new kind of fermented milk is however, produced using different flavoring agents or fruits (Zourari *et al.,* 1992). There is consumer's demand for a nutritious and healthy diet yogurt milks are also low in calories. This product is mainly recognized by the yoghurt are combined and way the fruit preparation. The majority of yogurts which are used for the preparation of fruit yoghurts are stirred yoghurts where fruit pulp is directly mixed with the yoghurt and then filled into the packages. Obviously organoleptic properties, such as appearance, taste, aroma, color and texture are also important. Besides their good sensory properties, fruit pulp used in yoghurts must also show suitable mixing behavior with the product. The soluble solids (TS) of these fruit preparations, depending on the product, may be varying 20 - 60%, and the pH is set to approx 4, thus adjusted to the usual pH of the fermented milk product. All of the properties include nutritional, chemical, technological, physical, functional and microbiological properties influenced by parameters, like as storage conditions, additives, chemical composition and storage time. Knowledge of yoghurt about its behavior during storage period is important, because its shelf life depend on whether the products display any of the chemical, physical or sensory properties unacceptable for usage. Changes in these properties of yoghurt determine the shelf life of the product (Ibtisam *et al*., 2010). Therefore, the aim of this study was to investigate the quality of fruit yoghurt and to compare effect of different fruit additives on physicochemical yoghurt properties during storage period.

MATERIALS AND METHODS

Material

Fresh milk was provided from the Pack Dairy Co. (Iran, Tehran). A frozen yogurt starter cultures CH1 (composed of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*) was purchased by Chr. Hansen (Milwaukee, USA). All chemicals were purchased from Merck (Darmstadt, Germany).

Fruit preparation

Peach and kiwi fruits were washed, the fruit skin was removed manually and the pulp was obtained from the crushed fruit. Cherry was washed and chopped. Sugar was mixed with fruit pulp in 30:70 ratio and pasteurized at 95°C for 5 min, and filled into jars. This marmalade was stored at ambient temperature until added to yogurt. (Tarakci, 2010)

Yogurt preparation

Yogurt preparation was according to Tammie and Robinson (1985). One sample of yogurt was taken as control and other sample was mixed with fruit marmalade at the rate of 7.0% and 10.0%. The fruit yogurt samples were stirred and filled in 250 g glass cups along with the fruit marmalade at the desired concentration. The control and samples were stored in the refrigerator at 5^{o}C for 10 days (Tarakci, 2003b).

Chemical analysis

All the samples were analyzed in duplicate for acidity, fat, protein, ash, and total solid (TS) content. The Kjeldahl method was down to measured protein content of sample (AOAC, 1990). Carbohydrate content was done according to National Standard No. 11692. Fat content was determine by the Gerber method (Kurt *et al.*, 1996) and ash by heating a 5g sample in a muffle furnace at 550^{o}C overnight (Marth ,1978). TS was determined using a drying oven (AOAC, 1990). Titratable acidity was defined in terms of % lactic acid (AOAC, 1990). The pH was measured with a pH meter (Hanna Instruments 8521).

Syneresis

One hundred gram of sample was placed on a filter paper resting on a funnel. After 2 hours at 7^{o}C, the weight of whey collected was used as syneresis (Tarakci, 2003a). The samples were measured at 1, 6, and 10 days' interval (Tarakci, 2003b).

Water holding capacity (WHC)

20 g sample of native yogurt (NY) was centrifuged for 10 min at 669g, and supernatant was removed and weighed (whey expelled (WE)). (Singh and Muthukun, 2008) The samples were analyzed at 1, 6, and 10 days interval (Tarakci, 2003b).

The WHC % was defined as:

$$\mathrm{WHC}\,(\%) = 100 \times \frac{\mathrm{NY} - \mathrm{WE}}{\mathrm{NY}}.$$

Sensorial characteristics

The control and fruit yogurt samples coded with different numbers were placed on glass plates and presented to the panelist in daylight, who were wanted to measure samples using a hedonic scale with 1 being the worst (1, worst) and 5, very well). The score given by panel member for sample was noted separately. The factors judged were: overall acceptability, appearance (by looking to sample, directly), consistency by spoon (by mixing sample with a spoon) and odor and taste properties by mouth. To determine odor, taste intensity and consistency by mouth, odor and taste intensity, a spoon of sample is taken and separated out by tongue. Water was used for mouth washing between each measurement. (Tarakci, 2010)

Data Analysis

Data collected from different tests were analyzed on software Minitab. One-way ANOVA was performed and separation of means was adjudged at $p < 0.05$.

RESULTS AND DISCUSSION

Chemical Composition

Some physicochemical properties of different fruits included peach, cherry and kiwi pulps used for production of fruit yogurt are shown in Table 1. Kiwi had the lowest pH (3.15) and highest acidity (0.62 %) and moisture (87.90 %) as compared to peach and cherry. Other properties including fat, protein and ash content were rather similar except of carbohydrate content that in cherry was somewhat higher than others.

Table 1. Composition of peach, cherry and kiwi pulps used for yogurt making.

Fruit	pH	Acidity	Moisture	Protein	Fat	Carbohydrate	Ash
Peach	4.51±0.01[a]	0.41±0.03[b]	86.51±2.11[a]	1.43±0.04[b]	0.52±0.06[a]	12.65±1.21[b]	0.68±0.46[c]
Cherry	3.82±0.02[b]	0.49±0.05[b]	81.76±1.24[b]	1.98±0.03[a]	0.41±0.02[b]	14.10±1.08[a]	0.73±0.01[b]
Kiwi	3.15±0.01[c]	0.62±0.02[a]	87.90±3.51[a]	1.21±0.09[b]	0.33±0.01[c]	11.21±0.93[c]	0.87±0.21[a]

[a-c:] Values in same column with same superscript are not significantly ($p < 0.05$) different

Chemical compositions of plain yogurt and fruit yogurt samples are shown in Table 2. The addition of fruit marmalade to yogurt increased acidity, protein, carbohydrate an ash content while decreased pH, moisture and fat content. The lowest ash content (0.70 %) associated with plain yogurt and the highest content (0.78 %) associated with yogurt with 10 % kiwi marmalade. This result was matched with data from Table1 that show the highest ash content related to kiwi. This result was in agreement with Mahmood *et al.* (2008) that shows addition of fruit marmalade to yogurt increased ash content of this product. But this data didn't agree with Tarakci (2003), who reported that with added fruit in yogurt, the ash content was a little decreased. Fruit yogurt with 10% cherry marmalade shows the highest level of carbohydrate (5.34%) and protein (4.21%) and plan yogurt shows the lowest content of carbohydrate and protein it means, 4.21 and 3.41%, respectively, also this difference was statistically significant ($p \leq 0.05$). All of fruit yogurts, in comparison to control showed the lower level of fat (3.16 - 3.22%). This phenomenon refers to low fat content of fruit that shows in Table 1, which affected total fat in end product, this difference between the control and sample was significant ($p \leq 0.05$). This result matched with Mahmood *et al.* (2008) and Tarakci (2003b). These workers reported that addition of fruit pulp increased carbohydrate and protein content and decreased of fat level of yogurt. There is statistically significant difference between control and yogurt from the point of pH and acidity. Between the entire sample yogurt without fruit show maximum level of pH (4.61) and the minimum content of acidity (1.21%). This appears to be related to acidity nature of fruit. And between the yogurt fruit sample, the lowest pH (4.01) and highest acidity (1.21%) related to the fruit yogurt with 10% of kiwi marmalade, due to high content of acidity in fresh kiwi (Table 1), that affected the acidity and pH of the final product. This greed with Mahmood *et al.,* (2008) and Tarakci (2003b) witch confirm fruit yogurt has higher acidity and lower pH than plan yogurt. Table 3 shows the results from the pH and titratable acidity of control and fruit yogurt during storage time. During storage time of yogurt lactic acid bacteria especially *Lactobacillus bulgaricus and Streptococcus thermophilus* produce the lactic acid, and therefore affects the pH and acidity of final product. So pH of all yogurt samples decreased and acidity increased. There were statistically significant differences ($P \leq 0.05$) in pH and titratable acidity between the both control yogurt and fruit yogurts during the storage time. In the control, first day of storage show the lowest of titratable acidity (0.83 %) and parallel the passing days of storage, up to sixth day this parameter increased to reach 1.20 %. After sixth days of storage, again, acidity show increasing trend, but slower than before. So statistically difference was shown between pH and acidity in first and sixth day of storage period but this parameter wasn't significant different between sixth and tenth day. ($p \leq 0.05$). The reason of this procedure refer to effect of lactic acid on starter microorganism witch certain concentration of lactic acid inhibited grow of them. This result agreed with Tarakci, (2010), who reported that in the first days of storage acidity increase rapidly and after that slowly. Similar process has shown for fruit yogurt but acidity of fruit yogurt, increased more than plain yogurt during storage period. This might be due to the higher TS level (low moisture) in fruit yogurt which affects production of lactic acid by starter culture. Between the fruit yogurt, in the tenth day of storage, the highest level of acidity (1.33%) refer to yogurt with 10 % of kiwi and cherry marmalade. The values of pH and acidity recorded in this study were consistent with the results obtained by Mahmood *et al.* (2008) and Tarakci (2010).

Serum separation

One of the most important problems of semisolid system like yogurt is syneresis that directly affects the consumer acceptability. High level of syneresis related to low capacity of water absorption that refers to low TS content of system (Mahmood *et al.,* 2008). The percent syneresis of control and different fruit yogurt during the storage time was shown in Table 4. The syneresis of yogurts were changed statistically significant ($p < 0.05$) that this difference was depend on kind of fruit, concentration of fruit and time of storage. In all sample in the first day of storage level of syneresis was very high. But parallel to passing time of storage syneresis was decreased. For example, mean value of syneresis in the first day and tenth day was about 23% and 19% respectively. This behavior may be explained on the basis that TS of fruit and especially active groups that present in fruit component can absorb free water of yogurt and inhibit of serum separation. But on the first day of production this active group didn't enough time for water absorption. On the other hand, during the production process, yogurt undergoes stress due to mixing

pressure. Also, fruit marmalade added to yogurt destroys jelly matrix of yogurt and therefore a few amount of water which is involved in the matrix, may separate and therefore syneresis was occur. On 10^{th} day of storage period, the syneresis level of control was higher than different kind of fruit yogurt. For example, in tenth day of storage the syneresis percent in control and fruit with 10 % cherry, kiwi and peach was, 24.9, 17.76, 20.93 and 18.94%, respectively. This result was in agreement with Tarakci, (2003). Yogurt, yogurt containing 10 % cherry had the lowest of syneresis and this result may be referring to high TS content of cherry as compared to peach and kiwi (Table1). This result is in agreement with Tarakci (2003). The change in water holding capacity (WHC) of fruit yogurt and control was similar to syneresis. It means in all the sample WHC on first day was lower than sixth or tenth day and in whole of storage time WHC of fruit yogurt was higher than control. Also parallel to the increase of the pulp concentration in yogurt formulation, WHC increased.

Table 2. Chemical composition of plain yogurt and different types of fruit yogurt.

sample	pH	Acidity (%)	Moisture (%)	Protein (%)	Fat (%)	Carbohydrate (lactose %)	Ash (%)
Plane yogurt	4.61 ± 0.01^a	0.83 ± 0.11^c	86.98 ± 0.05^a	3.41 ± 0.1^c	3.41 ± 0.12^a	4.21 ± 1.2^b	0.70 ± 0.01^b
Peach yogurt (7%)	4.52 ± 0.02^a	$0.91 + 0.21^b$	82.02 ± 1.02^b	4.10 ± 0.13^b	3.17 ± 1.01^b	5.23 ± 1.25^a	0.72 ± 0.03^b
Peach yogurt (10%)	4.52 ± 0.03^a	0.94 ± 0.01^b	79.42 ± 1.54^b	4.14 ± 0.15^b	3.19 ± 0.08^b	5.30 ± 1.02^a	0.76 ± 0.15^a
Cherry yogurt (7%)	4.41 ± 0.01^a	0.96 ± 0.35^b	82.32 ± 0.17^b	4.13 ± 1.21^b	3.22 ± 1.30^b	5.27 ± 2.01^a	0.71 ± 0.21^b
Cherry yogurt (10%)	4.23 ± 0.02^b	1.15 ± 0.31^a	81.13 ± 1.13^b	4.21 ± 0.32^a	3.16 ± 1.04^b	5.34 ± 1.10^a	0.76 ± 0.13^a
Kiwi yogurt (7%)	4.19 ± 0.00^b	1.17 ± 0.56^a	83.31 ± 0.98^b	4.08 ± 1.31^b	3.18 ± 0.81^b	5.20 ± 0.88^a	0.75 ± 0.12^a
Kiwi yogurt (10%)	4.01 ± 010^c	1.21 ± 0.04^a	81.09 ± 1.71^b	4.12 ± 1.13^b	3.16 ± 1.31^b	5.28 ± 1.04^a	0.78 ± 0.11^a

[a-c] Values in same column with same superscript are not significantly (P<0.05) different.

Table 3. pH and acidity of plane and fruit yogurt in storage period.

Sample	pH			Acidity (%)		
	Storage period(days)					
	First day	Sixth day	Tenth day	First day	Sixth day	Tenth day
Plane yogurt	4.61 ± 0.01^a	4.10 ± 0.01^b	4.01 ± 0.01^b	0.83 ± 0.01^b	1.01 ± 0.14^a	1.20 ± 0.15^a
Peach yogurt (7%)	4.52 ± 0.02^a	3.95 ± 0.00^b	3.91 ± 0.02^b	0.91 ± 0.02^b	1.22 ± 0.13^a	1.29 ± 0.12^a
Peach yogurt (10%)	4.52 ± 0.03^a	3.88 ± 0.02^b	3.87 ± 0.00^b	0.94 ± 0.11^b	1.27 ± 0.36^a	1.30 ± 0.07^a
Cherry yogurt (7%)	4.41 ± 0.01^a	3.90 ± 0.00^b	3.84 ± 0.00^b	0.96 ± 0.05^b	1.28 ± 0.02^a	1.31 ± 0.14^a
Cherry yogurt (10%)	4.23 ± 0.02^b	3.83 ± 0.10^b	3.79 ± 0.03^b	1.15 ± 0.21^b	1.30 ± 0.32^a	1.33 ± 0.91^a
Kiwi yogurt (7%)	4.19 ± 0.00^b	3.72 ± 0.03^b	3.61 ± 0.02^b	1.17 ± 0.56^b	1.29 ± 0.36^a	1.32 ± 0.04^a
Kiwi yogurt (10%)	4.01 ± 0.01^c	3.65 ± 0.01^b	3.62 ± 0.00^b	1.24 ± 0.04^b	1.31 ± 0.15^a	1.33 ± 0.14^a

[a-c] Values in same column with same superscript are not significantly (P<0.05) different.

Table 4. Syneresis (%) and WHC (%) of control and different fruit yogurt in storage time.

sample	Syneresis(%)			WHC(%)		
	Storage period(days)					
	First day	Sixth day	Tenth day	First day	Sixth day	Tenth day
Plane yogurt	27.32 ± 0.12[a]	23.63 ± 0.39[b]	24.91 ± 0.12[b]	67.21±1.41[b]	71.71 ± 0.01[a]	69.33 ± 0.01[a]
Peach yogurt (7%)	24.32 ± 0.45[a]	20.74 ± 1.01[b]	19.02 ± 0.23[b]	73.34 ± 0.11[b]	77.23 ± 0.86[a]	77.45 ± 0.74[a]
Peach yogurt (10%)	23.31 ± 1.03[a]	19.04 ± 0.56[b]	18.94 ± 0.51[b]	77.81 ± 1.09[b]	80.67 ± 0.92[a]	82.22 ± 0.86[a]
Cherry yogurt (7%)	22.21 ± 1.31[a]	18.96 ± 0.58[b]	18.22 ± 0.91[b]	75.16 ± 0.71[b]	79.56 ±1.04[a]	80.07 ± 1.03[a]
Cherry yogurt (10%)	21.16 ± 0.91[a]	18.38 ± 1.18[b]	17.76 ± 0.62[b]	77.57 ± 0.86[b]	81.33 ± 0.82[a]	82.56 ± 1.12[a]
Kiwi yogurt (7%)	23.57 ± 1.06[a]	21.19 ± 0.47[b]	21.54 ± 0.76[b]	73.05 ± 0.85[b]	76.57 ± 1.03[a]	75.56 ± 0.45[a]
Kiwi yogurt (10%)	22.11 ± 1.12[a]	20.05 ± 0.84[b]	20.93 ± 0.29[b]	73.98 ± 1.26[b]	77.83 ± 1.13[a]	78.93 ± 0.91[a]

[a-b:] Values in same column with same superscript are not significantly (P<0.05) different.

Table 5. Organoleptic properties of yogurt.

Sample	Appearance and color			Body and texture			Flavor		
	Storage period(days)								
	First	sixth	tenth	First	sixth	tenth	First	sixth	tenth
Plane yogurt	4.3 ± 0.14	4.4 ± 0.12	4.2 ± 0.14	4.2 ± 0.11	4.3 ± 0.14	4.0 ± 0.12	4.1 ± 0.14	4.5 ± 0.12	4.2 ± 0.63
Peach yogurt (7%)	4.6 ± 0. 21	4.9 ± 0.19	4.9 ± 0.03	4.1 ± 0.58	4.6 ± 0.68	4.3 ± 0.66	4.5 ± 0.44	4.8 ± 0.56	4.6 ± 0.75
Peach yogurt (10%)	4.4 ± 0.13	4.7 ± 0.64	4.1 ± 0.13	4.4 ± 0.73	4.8 ± 0.35	4.3 ± 0.46	4.4 ± 0.64	4.6 ± 0.13	4.5 ± 0.35
Cherry yogurt (7%)	4.2 ± 0.54	4.5 ± 0.65	4.0 ± 0.23	4.7 ± 035	4.8 ± 0.55	4.7 ± 0.59	4.6 ± 0.37	4.8 ± 0.46	4.5 ± 0.53
Cherry yogurt (10%)	4.3 ± 0.32	4.4 ± 0.92	4.1 ± 0.77	4.4 ± 0.45	4.7 ± 0.56	4.3 ± 0.22	4.3 ± 0.57	4.4 ± 0.15	4.1 ± 0.54
Kiwi yogurt (7%)	4.6 ± 0.83	4.8 ± 0.37	4.4 ± 0. 53	4.2 ± 0.54	4.5 ± 0.54	4.1 ± 0.12	3.2 ± 0.87	3.4 ± 0.17	3.1 ± 0.82
Kiwi yogurt (10%)	4.4 ± 0.91	4.6 ± 0.77	4.57 ± 0.21	4.3 ± 0.15	4.3 ± 0.64	4.2 ± 0.46	3.3 ± 0.15	3.6 ± 0.87	3.2 ± 0.95

Table 6. Overall acceptable scores of yogurt

Sample	overall acceptable scores		
	Storage period(days)		
	First	sixth	tenth
Plane yogurt	4.2±0.14[a]	4.3±0.11[a]	4.3±0.04[a]
Peach yogurt (7%)	4.4±0. 21[a]	4.6±0.17[a]	4.5±0.14[a]
Peach yogurt (10%)	4.2±0.05[a]	4.4±0.02[a]	4.5±0.27[a]
Cherry yogurt (7%)	4.5±012[a]	4.6±0.86[a]	4.3±0.21[a]
Cherry yogurt (10%)	4.2±0.38[a]	4.5±0.84[a]	4.0±0.11[b]
Kiwi yogurt (7%)	3.6±-.68[b]	4.00±0.83[b]	3.6 ±0.13[b]
Kiwi yogurt (10%)	3.5±-0.19[b]	3.7±0.39[b]	3.5±0.32[b]

[a-b:] Values in same column with same superscript are not significantly (P<0.05) different.

Sensory evaluations

Table 5 and 6, has shown different organoleptic properties of control and fruit yogurt (appearance and color, body and texture, flavor and overall acceptable scores). There were no significant differences for, appearance, color, smell, body and texture for all experimental samples. As regards to the overall acceptable scores significant difference was shown in kiwi fruit (all concentration and all the time of storage) and cherry fruit (10%, in tenth day of storage). Accordingly, kiwi yogurt had less acceptability to the consumers. This result far from of Tarakci (2010) who reported that kiwi yogurt has good consumer acceptability

Conclusion

This result, there were differences in physicochemical and sensory properties of fruit yoghurt as compare to control plane yogurt. Also different fruits and their concentrations have different effects on yogurt properties especially sensory properties. Panelist preferred peach and cherry added yoghurt compared to kiwi.

REFERENCES

AOAC. (1990). AOAC International. *Official Methods of Analysis*. 15th ed. AOAC, Arlington,VA.

Barnes, D. L., S.J. Harper, F. W. Bodyfelt and M.R. McDaniel (1991). Correlation of descriptive and consumer panel flavor ratings for commercial prestirred strawberry and lemon yogurts. *Journal of Dairy Science*, 74(7): 2089–2099.

ISIRI. (2001). Institute of Standards and Industrial Research of Iran (ISIRI). (2001). Fruit yoghurt, No, 4046.

Ibtisam, A. H. A. A., E. M. E. Zubeir and O. A. O. Owni (2010). Some Technological and Compositional Aspects of Set Yoghurt from Reconstituted Whole and Mixed Milk Powder. *Research Journal of Agriculture and Biological Sciences*, 6(6): 829-833.

ISIRI. (2011). *Fruit and its products*. No: 11692.

Kurt, A., S. Çakmak and A. Çağlar (1996). Standard methods for analysis of milk and milk products. Atatürk University Publication Center. Publication number 252/d.

Lubers, S., N. Decorsele and N.J. Vallenten (2004). Flavor Release and Rheology Behavior of Strawberry Fat free Stirred Yogurt during Storage. *Agricultural and Food Chemistry*, 52: 3077-3082.

Mahmood, A., N. Abbas and A.H. Gilani (2008). Quality of stirred buffalo milk yogurt blended apple and banana fruits. *Pakistan Journal of Agricultural Sciences*, 45(2): 275- 279.

Marth, E. H. (1978). *Standard methods for the examination of dairy products*. 14th ed. American. Public Health Association, Washington, D.C

Singh, G. and K. Muthukun (2008). Influence of calcium fortification on sensory, physical and rheological characteristics of fruit yogurt. *Learning with Technologies*, 41: 1145–1152.

Tamime, A. Y. and R. Robinson (1985). *Yoghurt: Science and technology*. Pergamon Press., Oxford.

Tarakci, Z. (2003a). Influence of Different Fruit Additives on Some Properties of Stirred Yoghurt During Storage. *Journal of food sciences*, 13(2): 97-101.

Tarakci, Z. (2003b). Physical, Chemical, Microbiological and Sensory Characteristics of Some Fruit-Flavored Yoghurt. *YYÜ Vetriner Fakul Dergisi*, 14 (2): 10-14.

Tarakci, Z. (2010). Influence of Kiwi Marmalade on the Rheology Characteristics, Color Values and Sensorial Acceptability of Fruit Yogurt .*Kafkas Univ Vetriner Fakul Dergisi*, 16 (2): 173-178.

Tromp, H., C.G. de Kruif, M. van Eijk and C. Rolin (2004). On the mechanism of stabilization of acidified milk drinks by pectin. *Food Hydrocolloids*, 18(4): 565–572.

Vahedi, N., M. Mazaheri Tehrani and F. Shahid (2008). Optimizing of Fruit Yoghurt Formulation and Evaluating Its Quality During Storage. *American-Eurasian Journals of Agriculture & Environmental Science*, 3 (6): 922-927.

Zourari, A., J.P. Accolas and M.J. Desmazeaud (1992). Metabolism and biochemical characteristics of yogurt bacteria. A review. *Lait.*, 72: 1-34.

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