J. Agric. Sci. Mansoura Univ., 33 (12): 8639 - 8648, 2008

UTILIZATION OF XANTHAN GUM IN THE MANUFACTURE OF PEANUT YOGHURT LIKE – PRODUCT

Murad, H.A. and Sahar H. S. Mohamed
Dairy Sci. Dept., National Res. Center, Dokki, Giza.

ABSTRACT

Peanut milk was prepared and separately supplemented with different concentrations of xanthan gum, pectin, gelatin, carrageenan, skim and whole milk. The different preparations were fermented with yoghurt starter at 42°c for 3-4h. The chemical, microbiological, rheological and sensory attributes of the resultant yoghurt like-products were investigated.

All These additions had no effect on pH values, or lactic acid bacterial counts of peanut yoghurt like-product when fresh or during storage. In addition, mould and yeasts as well as coliform groups were not detected in the all fermented preparations, either when fresh or during storage. The use of xanthan gum (0. 1%) with lactose (4%) and whole milk (50%) increased the curd tension of peanut yoghurt. Peanut yoghurt prepared with 4% lactose, 0.1 % xanthan gum and 50% whole milk gained the highest sensory scores compared to the corresponding products of other treatments.
Keywords: Peanut milk, yoghurt like product, xanthan gum,

INTRODUCTION

In response to environmental concerns, some industries which have previously used non-degrading polymers in their products and raw materials have looked closely at the possibilities of using materials that are greener and environmentally friendly (Rosalam and England 2006).

Xanthan gum has discovered in the late 1950s by US scientists and is the first biopolymer produced industrially (Rosalam and England 2006). Xanthan gum is an extracellular hetero-polysaccharide, which is produced by the aerobic fermentation of *Xanthomonas campestris* (Psomas, *et al.*, (2007).

Xanthan gum is widely used in a broad range of industries, such as food, toiletries, oil recovery, cosmetics, as water-based paints, etc., due to its superior rheological properties and is used as rheological control agent in aqueous systems and as stabilizer for emulsions and suspensions. The important properties of xanthan gum is the ability to form high viscosity solution at low shear forces, highly pseudoplastic and may also display a viscosity yield value. Yoshida *et al* (1993). On the other hand, preparing yoghurt-like products that are free from defects in body, consistency and syneresis continues to be a problem in the dairy and dairy-like industries. Stabilizer gums such as xanthan gum are used to improve the texture, increase the firmness and prevent syneresis in yoghurt (Kalab, *et al.*, 1975 and Abd El Salam, *et al.*, 1996). Fresh peanuts contain about 44-56% oil and 22-30% protein. In that oil, the major fatty acids are 56 % oleic (monounsaturated), 20% linoleic (polyunsaturated) and 8% palmitic (saturated). In both animal and human studies monounsaturated as well as polyunsaturated fatty acids have been shown to be beneficial in reducing heart disease. (Ziboh, *et al.*, 2000). Nutrients which have been demonstrated in either human or animal studies to be required for the immune system to function efficiently include essential amino acids, essential fatty acids, vitamin A, folic acid, vitamin B6, vitamin B12, vitamin C, vitamin E, zinc, iron and selenium. Many of those components can be found in Peanut milk. (**Calder,** and Grimble, 2002). The objective of our investigation was therefore to utilize peanut milk to prepare yoghurt-like product and determine the influence of laboratory-produced xanthan gum on the microbiological, rheological and sensory properties of peanut yoghurt during refrigerated storage.

MATERIALS AND METHODS

Raw peanut was obtained from the local market. Giza, Egypt.

Peanut milk

Peanut milk prepared according to Murad *et al.*, (1997).

Fresh skim and whole cow's milk used in this study were obtained from the herd of Faculty of Agriculture, Cairo University.

Yoghurt starter *Lactobacillus delbrueckii* supsp *bulgaricus* and *Streptococcus salivarius* subsp *thermophilus* were obtained from Ch. Hansen. Copenhagen. Denmark.

Standard xanthan gum was obtained from the U.S. Department of Agriculture (Peoria, IL).

Xanthan gum was produced in the laboratory from hydrolyzed UF-milk permeat by locally isolated *xanthomonas campestris* Sahar, (2000).

Gelatin, Pectin and Carrageenan were obtained from BDH (Poole, England).

Methods

Experimental procedure

Treatment (1) involved peanut milk supplemented with amounts of lactose ranged from 1 to 5%. Treatment (2) in which several portions of peanut milk were separately supplemented with 0.1 and 0.2% of different stabilizers including xnthan gum, pectin, gelatin and carragenan. Treatment (3) including peanut milk supplemented with 50% skim milk and Treatment (4) prepared with peanut milk supplemented with 50% of whole milk. Control preparation which is peanut milk free from any supplements was prepared as well. The stabilizers (treatment 2) were dissolved in a small quantity of peanut milk, and then added to the rest. All treatments were heated to 90 °C for 10 min and rapidly cooled to 42 °C, inoculated with 2% starter culture, and were then distributed into 50 ml plastic cups and incubated at 42 °C for 2-3 hrs until a uniform coagulum. The peanut yoghurt cups were then transferred to refrigerated storage and analyzed after 1, 7 and 14 days of storage for their microbiology, rheology and sensory properties.

pH values were measured using pH-meter with glass electrode , model 5.1 at 20 °C.

Lactic acid bacteria were counted on agar plat medium of Elliker *et al.*, (1956).

Mould and yeast count were determined using malt agar medium according to Harrigan and Mccance (1966).

Coliform counts were determined according to Harrigan and Mccance (1966) using violet red bile agar medium.

The curd tension (g) of peanut yoghurt was measured by the method of chandrcasckhara *et al.*, (1957).

Syneresis was determined by measuring the volume of separated whey (ml whey/50 gm peanut yoghurt). The amount of free whey collected after 30 min at room temperature (25± 1 °C) was taken as the index of syneresis.

Sensory evaluations of peanut yoghurt of different treatments were carried out by a regular score panel from the staff of the Dairy Department.

RESULTS AND DISCUSSION

Preliminary experiment was carried out to test the different concentrations of lactose added to the peanut yoghurt in order to choose the best concentration.

From the sensory evaluation of peanut yoghurt prepared with different concentrations of lactose (1-5%), data shown in Table (1) revealed that the use of 4% lactose in peanut yoghurt had significant highest score 80% compared to control and other concentrations. Table (2) showed the changes of pH and the viability of lactic acid bacteria (LAB) in peanut yoghurt supplemented with lactose. Results indicated that no significant effect on the development rates of pH values between treatments and control during the storage period. This result was in line with those reported by Murad *et al.*, (1997). From the same table, the viability of LAB decreased in all peanut yoghurt treatments and as well with the control at the end of storage periods compared with their counts of the fresh preparations. It could also be noted that peanut yoghurt supplemented with lactose and control exhibited significant increas in viability of LAB after 7 days of storage. This result could be attributed to the presence of some growth promoting factors in peanut milk which may stimulate the bacterial count of peanut yoghurt Manore, (2000). No mould, yeasts or coliform groups were detected in any peanut yoghurt treatments when fresh or during refrigerated storage.

Table (1): Sensory evaluation of peanut yoghurt supplemented with lactose.

Treatment	Appearance (10)	Body & texture (40)	Flavor (50)	Total (100)
Control	7^{A}	31^{B}	22^{D}	60^{D}
T1	7^{A}	34^{A}	32^{C}	73^{C}
T2	7^{A}	33^{A}	35^{A}	75^{B}
T3	7^{A}	32^{B}	36^{B}	75^{B}
T4	7^{A}	33^{A}	40^{A}	$+80^{A}$
T5	7^{A}	31^{B}	35^{B}	73^{C}

Control= peanut yoghurt with no addition of lactose.
T1= peanut yoghurt with 1% lactose. T2= peanut yoghurt with 2% lactose. T3= peanut yoghurt with 3% lactose.
T4= peanut yoghurt with 4% lactose. T5= peanut yoghurt with 5% lactose. Means with the same capital litter in the same column are not significantly different at $p \leq 0.05$.

Curd tension and syneresis of peanut yoghurt supplemented with lactose are presented in Table (3). The results reveal that the significant increase of curd tension (18.2 g) was obtained when peanut milk supplemented with lactose (1-5%) compared with control (7.8 g).The increased of curd tension of peanut yoghurt could be attributed to the presence of lactose which fermented by LAB and ceased the increasing of curd tension compared with control. As known, peanut milk does not contain any lactose. From the results in Table (3) an increase in the syneresis rate of the control could be observed, while the susceptibility to syneresis was decreased with the addition of lactose.
From these results, peanut yoghurt supplemented with 4% lactose was applied in further work.

Table (2): Changes in pH and the viability of LAB in peanut yoghurt supplemented with different lactose concentrations.

Treatments	Lactose %	Storage period, d pH 1	7	15	(LAB) log/ml 1	7	15
*Control	0	5.9^{Aa}	5.2^{Ba}	5^{Ba}	7.39^{Bb}	7.47^{Ab}	6.93^{Ca}
T1	1	5.7^{Aab}	4.2^{Bb}	4^{Bb}	7.4^{Bb}	7.6^{Aa}	6.39^{Ce}
T2	2	5.5^{Ab}	5.12^{Ba}	5^{Ba}	6.88^{Bd}	7.53^{Ab}	6.7^{Cc}
T3	3	5.5^{Ab}	5.2^{Ba}	5^{Ba}	8.48^{Aa}	7^{Bc}	6.78^{Cb}
T4	4	5.4^{Ab}	4.9^{Ba}	4.8^{Bab}	7.41^{Ab}	6.78^{Bd}	6.48^{Cd}
T5	5	5.4^{Ab}	5.3^{Aa}	5^{Ba}	7.3^{Bc}	7.65^{Aa}	5.95^{Cf}

Control= peanut yoghurt with no addition of lactose. Means with the same capital letter in the same row are not significantly different at $p \leq 0.05$. Means with the same small letter in the same column are not significantly different at $p \leq 0.05$.

Table (3): Curd tension and synersis of peanut yoghurt supplemented with different lactose concentrations during refrigerated storage.

Treatments	Lactose %	Storage period, d Curd tension (g) 1	7	15	Syneresis ml/50g 1	7	15
Control	0	7.8^{C}	Non	Non	Non	19^{Aa}	13^{Bb}
T1	1	18.2^{B}	Non	Non	Non	2.2^{Ba}	2.3^{Ca}
T2	2	18.2^{B}	Non	Non	Non	1.1^{Da}	1.1^{Da}
T3	3	18.2^{B}	Non	Non	Non	1.1^{Da}	1.1^{Da}
T4	4	18.2^{B}	Non	Non	Non	1.1^{Da}	1.1^{Da}
T5	5	18.2^{B}	Non	Non	Non	1.1^{Da}	1.1^{Da}

Control= peanut yoghurt with no addition of lactose. Means with the same capital letter in the same column are not significantly different at $p \leq 0.05$. Means with the same small letter in the same row are not significantly different at $p \leq 0.05$.

pH and the viability of LAB

Results obtained shown in Table 4, 5 and 6 indicated the pH and the viability of LAB in peanut yoghurt treatments. The addition of different stabilizers (Table 4) at tested concentrations had no significant effect on the value of pH compared with the control. The same result was observed when peanut yoghurt fortified with different concentrations of skim and whole milk (Table 5 and Table 6 respectively). These results were in line with those reported by Abd El Salam et al., 1996, who found that the type of stabilizer had no effect on the development of acidity during the yoghurt storage.

Table (4): Changes in pH and viability of LAB in peanut yoghurt supplemented with different stabilizers.

Treatments	Stabilizers use%	Storage period, d					
		pH			(LAB) log/ml		
		1	7	15	1	7	15
Control	0	5.4^{Aa}	4.9^{Aa}	4.0^{Aa}	7.4^{Ac}	6.8^{Bd}	6.5^{Bc}
T1	Xanthan gum						
	0.1	5.16^{Aa}	4.9^{Aa}	4.6^{Aa}	7.8^{Ab}	7.99^{Abc}	7.4^{Ba}
	0.2	5.03^{Aa}	4.4^{Aa}	4.3^{Ab}	7.5^{Bc}	8.6^{Aa}	6.0^{Cd}
T2	Pectin						
	0.1	5.02^{Aa}	4.6^{Aa}	4.7^{Aa}	6.6^{Ae}	6.6^{Ad}	6.0^{Bd}
	0.2	4.99^{Aa}	4.5^{Aa}	4.7^{Aa}	6.3^{Af}	5.3^{Be}	4.7^{Ce}
T3	Gelatin						
	0.1	5.1^{Aa}	4.9^{Aa}	4.2^{Bb}	7.08^{Bd}	7.8^{Ac}	6.0^{Cd}
	0.2	5.3^{Aa}	5^{Aa}	4.7^{Aa}	4.5^{Ch}	8.2^{Ab}	6.9^{Bb}
T4	Carageenan						
	0.1	5.0^{Aa}	4.7^{Aa}	4.2^{Bb}	6.98^{Bd}	7.7^{Ac}	6.3^{Cc}
	0.2	5.0^{Aa}	4.7^{Aa}	4.4^{ABa}	7.3^{Ac}	6.8^{Bd}	6.5^{Bc}
T5	Isolated xanthan gum						
	0.1	5.7^{Aa}	5.2^{Aa}	4.9^{Aa}	8.3^{Aa}	7.9^{Bc}	6.8^{Cbc}
	0.2	5.2^{Aa}	4.8^{Aa}	4.6^{Aa}	7.9^{Ab}	7.8^{Ac}	5.9^{Bd}

Control= peanut yoghurt supplemented with 4% lactose. Means with the same capital litter in the same column are not significantly different at $p \leq 0.05$. Means with the same small letter in the same row are not significantly different at $p \leq 0.05$.

Table (5): Changes in pH and viability of LAB in peanut yoghurt fortified with whole milk.

Treatments	Whole milk%	Storage period, d					
		pH			(LAB) log/ml		
		1	7	15	1	7	15
Control	0	5.4^{Aa}	4.9^{Ba}	4.4^{Ca}	7.6^{Aabc}	7.2^{Bab}	5.8^{Cbc}
T1	10	4.5^{Ac}	4.2^{ABbc}	4^{Bbc}	7.8^{Aa}	6.5^{Bc}	4.95^{Cd}
T2	20	4.6^{Ac}	4.4^{ABb}	4.2Bb	7^{Ac}	4.9^{Be}	4.3^{Ce}
T3	30	4.7^{Ac}	4.2^{Bbc}	4.1^{Bbc}	7.7^{Aab}	6.1^{Bd}	4.5^{Ce}
T4	40	4.7^{Ac}	4.4^{ABb}	4.1^{Bbc}	6.5^{Acd}	6.2^{Bcd}	6.3^{ABa}
T5	50	4.6^{Ac}	4.2^{Bbc}	3.9^{Bbc}	6.4^{Acd}	6^{ABd}	6^{ABab}

Control= peanut yoghurt with 4% lactose + 0.1% xanthan gum. Means with the same small litter in the same column are not significantly different at $p \leq 0.05$. Means with the same capital letter in the same row-are not significantly different at $p \leq 0.05$.

Table (6): Changes in pH and viability of LAB in peanut yoghurt fortified with skim milk.

Treatments	Skim milk%	Storage period, d pH 1	7	15	(LAB) log/ml 1	7	15
Control	0	4.9^{Ab}	4.8^{Ab}	4.6^{Aab}	7.8^{Aab}	7.99^{Aa}	7.0^{Bb}
T1	10	5.4^{Aa}	5.2^{Aa}	4.5^{Bb}	6.9^{Ad}	6.9^{Aa}	6.4^{Bc}
T2	20	5^{Ab}	4.7^{ABbc}	4.5^{Bb}	7.4^{Ac}	6.7^{Ba}	6.5^{Cc}
T3	30	4.9^{ABb}	5.2^{Aa}	4.7^{Ba}	6.9^{Ad}	5.3^{Bf}	5.1^{Be}
T4	40	4.9^{Ab}	4.6^{ABbc}	3.9^{Cd}	5.7^{Ce}	7.6^{Abc}	7.3^{Bab}
T5	50	5.2^{Aab}	4.9^{Bb}	4.4^{Cbc}	5.7^{Ce}	7.4^{Ac}	7.3^{Aab}

Control= peanut yoghurt with 4% lactose + 0.1% xanthan gum. Means with the same small litter in the same column are not significantly different at $p \leq 0.05$. Means with the same capital letter in the same row are not significantly different at $p \leq 0.05$.

In the same Tables, the viability of LAB was decreased in all peanut yoghurt treatments at the end of storage periods compared with their initial counts. However, Table (4) revealed that the LAB counts of peanut yoghurt was not affected by the use of stabilizers during storage. The increase in LAB counts after 7 days could be attributed to the presence of some growth factors in peanut milk such as vitamin E and B6, thiamine, amino acid, arginine and lysine which may stimulate the bacterial count of peanut yoghurt (Manore, 2000). Results shown in Table 5 and 6 indicate that the addition of different skim and whole milk concentrations had no significant effect on the viability of LAB compared with control.

Curd tension and syneresis

Results obtained and shown in Table 7, 8 and 9 exhibit the curd tension and syneresis of peanut yoghurt. Table 7 indicates that the addition of standard and isolated xanthan gum at 0.1% concentration significantly increased the curd tension of peanut yoghurt compared with the control and other stabilizers in fresh preparations. This significant increase may be attributed to the interaction between the gum and the peanut protein (Grindrod and Nickerson 1968, Schmidt and Smith 1992). In contrast, the use of xanthan gum at 0.2% had no significant effect on curd tension of peanut yoghurt. In the same table an increase of syneresis rate of the peanut yoghurt made by gelatin 0.1and 0.2% and carrageenan 0.1% could be observed, while no syneresis was found with standard and isolated xanthan gum. Harwiker and Kalab 1986 and Abd El Salam *et al* 1996 have reported that the use of thickening agents such as xanthan gum is being considered as a method of controlling syneresis of fermented milk. Peanut yoghurt fortified with 10-30% skim milk had no significant increase in curd tension; however the peanut yoghurt fortified with 40-50% skim milk exhibit the same curd tension of control as presented in Table 8. No syneresis was observed in the fresh or during storage period of all preparations. Peanut yoghurt fortified with 50% whole milk (Table 9) showed significant increase on curd tension compared with the control, as well as 40% whole milk exhibited the same curd tension as the control. However addition of 10-30% of whole milk to peanut milk had no significant effect on curd tension of the resultant peanut yoghurt.

Table (7): Curd tension and syneresis of peanut yoghurt supplemented with different stabilizers during refrigerated storage.

Treatments	Stabilizers use%	Storage period, d					
		Curd tension (g)			Syneresis ml/50g		
		1	7	15	1	7	15
Control	0	18.2^{D}	Non	Non	Non	Non	Non
T1	Xanthan gum 0.1	27.3^{A}	Non	Non	Non	Non	Non
	0.2	9.98^{F}	Non	Non	Non	Non	Non
T2	Pectin 0.1	5.2^{H}	Non	Non	Non	Non	2.2^{A}
	0.2	2.5^{I}	Non	Non	Non	Non	Non
T3	Gelatin 0.1	7.8^{G}	Non	Non	8^{Bc}	15.1^{Bb}	32.9^{Ba}
	0.2	12.14^{E}	Non	Non	4.4^{Bb}	4.4^{Cb}	7.6^{Ca}
T4	Carageenan 0.1	19.13^{C}	Non	Non	9.8^{Ab}	8.9^{Bc}	37.3^{Aa}
	0.2	25.8^{B}	Non	Non	Non	Non	Non
T5	Isolated xanthan gum 0.1	27.3^{A}	Non	Non	Non	Non	Non
	0.2	12.14^{E}	Non	Non	Non	Non	Non

Control= peanut yoghurt supplemented with 4% lactose. Means with the same capital litter in the same column are not significantly different at $p \leq 0.05$. Means with the same small letter in the same row are not significantly different at $p \leq 0.05$.

Table (8): Curd tension and synersis of peanut yoghurt fortified with skim milk during refrigerated storage.

Treatments	Skim milk%	Storage period, d					
		Curd tension (g)			Syneresis ml/50g		
		1	7	15	1	7	15
Control	0	27.3^{A}	Non	Non	Non	Non	Non
T1	10	18.2^{B}	Non	Non	Non	Non	Non
T2	20	18.2^{B}	Non	Non	Non	Non	Non
T3	30	18.3^{B}	Non	Non	Non	Non	Non
T4	40	27.2^{A}	Non	Non	Non	Non	Non
T5	50	27.2^{A}	Non	Non	Non	Non	Non

Control= peanut yoghurt with 4% lactose + 0.1% xanthan gum. Means with the same capital litter in the same column are not significantly different at $p \leq 0.05$.

Table (9): Curd tension and synersis of peanut yoghurt fortified with whole during refrigerated storage.

Treatments	Whole milk%	Storage period, d Curd tension (g) 1	7	15	Synerésis ml/50g 1	7	15
*Control	0	27.3^B	Non	Non	Non	Non	Non
T1	10	14.8^E	Non	Non	7.6^Aa	4.4^Ec	6.4^Eb
T2	20	18.2^D	Non	Non	8^Ab	5.6^Cd	12^Aa
T3	30	22.14^C	Non	Non	4.8^Bc	8^Bb	8.4^Ca
T4	40	27.3^B	Non	Non	2^Cc	6^Cb	8^Da
T5	50	51.7^A	Non	Non	8^Ac	10^Ab	10.4^Ba

Control= peanut yoghurt with 4% lactose + 0.1% xanthan gum. Means with the same capital litter in the same column are not significantly different at $p \leq 0.05$. Means with the same small letter in the same row are not significantly different at $p \leq 0.05$.

Sensory evaluation

Table 10 gives the average scores for sensory evaluation of peanut yoghurt, as affected by using xanthan gum, skim milk and whole milk. The addition of xanthan gum or skim and whole milk had no adverse effect on the peanut yoghurt flavor. No foreign or undesirable flavor was detected in any of the treatments. However, they had variable effects on the body and texture of peanut yoghurt. The peanut yoghurt containing xanthan gum at concentration of 0.1% and peanut yoghurt fortified with 50% whole milk gained the highest score, while the control had the lowest total score.

Table (10): Sensory evaluation of peanut yoghurt supplemented with lactose.

Treatment	Appearance (10)	Body & texture (40)	Flavor (50)	Total (100)
*Control	7^A	31^C	22^B	60^C
*T1	8^A	33^B	40^A	80^B
*T2	8^A	38^A	40^A	86^A
*T3	8^A	38^A	40^A	86^A

*Control= Peanut milk without any additions.
*T1=Peanut milk+4% lactose. *T2= Peanut milk+4% lactose+.1% xanthan gum.
*T3= Peanut milk 50%+50%whole milk. Means with the same capital litter in the same column are not significantly different at $p \leq 0.05$.

From these results, it could be concluded that the use of xanthan gum as stabilizer at concentration of 0.1% or the use of 50% whole milk in peanut yoghurt manufacture, improved their organoleptic and rheological properties, and these results support using of xanthan gum in the production of fermented dairy-like products.

REFERENCES

Abd El-Salam, M. H.; El- Etriby, M. H. and Shahein, N. M. Egypt. (1996). Influence of some stabilizers on some chemicaland physical properties of yoghurt. J. Dairy Sci. 24:25.

Calder, P.C. and Grimble, R.F. (2002). Polyunsaturated fatty acids, inflammation and immunity. Eur J Clin Nutr 56 Suppl 3, S14-9.

Chandrcasckhara, M.R.; Bhagawan, R.K.; Swaminathan, M., and subrahmanyan V. (1957). The use of mammalian and processed milk food in the feeding of infant. Indian J Child Health. 6:701.

Elliker, P.R.; Anderson, A.W. and Hannesson, G. (1956). An agar medium for lactic acid streptococci and lactobacilli. J Dairy Sci. 39:1611.

Grindrod, J. and Nickerson, T.A. (1968). Effect of various gum on skim milk and purified milk proteins. J. Dairy Sci. 51:834.

Harrigan, W.F. and McCance, M.E. (1966). Laboratory Methods in Microbiology. Academic Press, London and New York.

Harwalkar, V.R. and Kalab, M. (1986). Relationship between microstructure and susceptibility to syneresis in yogurt made from reconstituted nonfat dry milk. Food Microstructure. 5:287.

Kalab, M.; Emmons, D. B. and Sargant, A. G. (1975). Milk gel structure. IV. Microstructure of yogurt in relation to the presence of thickening agents. J Dairy Res. 42:453.

Manore, M.M. (2000). Effect of physical activity on thiamine, riboflavin and vitamin

B-6 requirments. Am. J. Clin. Nutr. 72: 598-606.

Murad, H.A.; Fatma A. Fathy and Abdel Ghani, S. (1997). Growth of Bifidobacterium bifidum in buffalo milk supplemented with peanut milk and some amino acids. Egypt. J. Dairy Sci. 25: 75-84.

Psomas, S.K.; Liakopoulou-Kyriakides, M. and Kyriakidis, D.A. (2007). Optimization study of xanthan gum production using response surface methodology. Biochemical Engineering Journal. 35:273-280.

Rosalam, S. and England, R. (2006). Review of xanthan gum production from unmodified starches by Xanthomonas campestris sp. Enzyme and Microbial Technology. 39:197-207.

Sahar H.S. Mohammed. (2000). Production of microbial polysaccharide xanthan gum and its application in some dairy and dairy-like products. Thesis of Master degree, Dairy Sci. and Technology. Faculty of Agriculture Cairo University.

Schmidt, K.A. and Smith D.E. (1992). Reological properties of gum and milk protein interaction. J. Dairy Sci. 75:36.

Yoshida T. and Tanner R.D. (1993). Bioproducts and Bioprocess. Vol 2, Berlin, Heidelbery, Germany: Springer-Verlag.
Ziboh, V.A., Miller, C.C., Cho, Y. (2000) Metabolism of polyunsaturated fatty acids by skin epidermal enzymes: generation of antiinflammatory and antiproliferative metabolites. Am J Clin Nutr 71, 361S-6S.

الاستفادة من صمغ الزانثان فى تصنيع شبية اليوجهورت من الفول السودانى

حسين عزاز مراد و سحر حسن صلاح محمد
قسم الالبان – المركز القومى للبحوث– الدقى– الجيزة

تهدف هذة الدراسة الى استخدام لبن الفول السودانى فى تصنيع شبية اليوجهورت والاستفادة من صمغ الزانثان في تحسين الصفات الريولوجية للمنتج.

تم تحضير لبن الفول السودانى بتدعيمة كلا على حدة بتركيزات مختلفة من كل من صمغ الزانثان, الجيلاتين, البكتين و اللبن (الفرز وكامل الدسم). و قد تم اضافة بادىء الزبادى لكل التحضيرات المختلفة و تحضينها على 42°م لمد 3-4 ساعا ت. وتم دراسة كل من الخواص الكميائية و الميكروبية والريولوجية و كذالك التقيم الحسى لمنتج شبية اليوجهورت.

و قد أوضحت النتائج أن:

كل الاضافات ليس لها تأثير على قيم pH أو أعداد بكتريا حامض الاكتيك بالنسبة لمنتج شبية اليوجهورت و ذالك للعينات الطازجة و المخزنة حتى أسبوعين. ولم تظهر التحليلات اى وجود لمجموعة بكتريا القولون وكذالك الفطريات و الخمائر في كل التحضيرات المختلفة الطازجة و أثناء التخزين. وقد أدى استخدام صمغ الزانثان بتركيز 0.1% مع 4% لاكتوز و كذالك استخدام لبن كامل الدسم 50% مع لبن الفول السودانى 50% الى زيادة تماسك خثرة شبية اليوجهورت (curd tension) مقارنة بالمعاملات الاخرى وكذالك أدت هذة الاضافات الى تحسين الخواص الحسية للمنتج مقارنة بالمعاملات الاخرى.