ISSN 1110-0419

Annals Of Agric. Sc., Moshtohor,
Vol. 43(2): 699-709, (2005).

PRODUCTION OF FORTIFIED YOGHURT USING CHUFA MILK AND ITS UTILIZATION IN CAKE MAKING

BY

Ehab, A.Y. Essawy, Nadia, H.A. Assem and Hala, A. Abd El-Rahman
Food Technology Res. Institute, Agricultural Res. Center, Giza, Egypt.

ABSTRACT

Using of fortified buffaloe's milk with chufa for production of yoghurt was studied. Four treatments were manufactured from standardized buffaloe's milk (4% fat) with chufa milk at ratio of 15, 25, 50 and 75%, respectively in addition to control treatment (4% fat). Results revealed that, the use of chufa milk in yoghurt production does not affect its fat and total solids content during cold storage for 14 days. On the other hand protein and ash decreased in parallel with increasing chufa substitution level than the control. Total carbohydrate increased in a parallel with chufa substitution level of the fresh samples, meanwhile, it decreased during storage. pH values slightly affected by chufa substitution levels and cold storage period. Acetaldehyde and diacetyle contents were higher in control than all treatments. A slight decrease was found in wheying-off due to substitution with chufa milk. Scores of sensory evaluation decreased by increasing chufa milk substitution level resulted in slightly darker color and the texture become softer and smoother at 75% chufa milk. From the sensory evaluation it could be concluded that it is possible to make a good quality yoghurt from buffaloe's milk by using chufa milk at levels of 15 and 25%.

Cup cake was prepared from fortified yoghurt made from 15% chufa milk extraction of water gives the best results for physical properties, sensory evaluation and chemical composition.

INTRODUCTION

Fermented milk and dairy products induced changes in the equilibrium and metabolism of the intestinal microflora and may have beneficial effects on the host (Rizkalla *et al.*, 2000).

In the recent pears, there is on increase consumption of dairy products especially fermented dairy product and this is primarily explained by the diversity of products available and the healthy images them posses. The characteristics of a fermented milk product depends on the type of microorganisms used during fermentation as they produce essential metabolic and products such as flavour compound and acids.

One of the agricultural crops which worth evaluation for such purposes are the chufa plant. In Egypt the chufa is soaked overnight and consumed fresh, but the most popular application is the preparation of "Horchate de chufa" as it is a milky looking extract. The tuber (fresh or dried)" are eaten like nuts or pounded

into cakes and served at the end of a meal (Linssen *et al.*, 1988). The best-known application of chufa in food technology being in the production of hor chata chufa (milk of chufa). It is also used successfully as flavoring agent in ice cream (Coskumer *et al.*, 2002). Also, it is partially used in substituting of buffaloe's skim milk during making a new ice milk product (Abd El Rahman and Hassen 2004). Chufa milk has been recommended as a whole milk substitute for allergic babies to mother's and cow's milk. The chufa tuber is good for human healthy, containing high levels of iron and potassium further more there is no sodium (Mokady and Doley 1970).

Chufa tubers relatively are high in total antioxidant capacity, water soluble flavonoid glycosides, and consumption of antioxidants could protect the immune system of malnourished populations. The intake of foods containing antioxidant may delay the progression of HIV infection to AIDS (Pascual *et al.*, 2000).

The main target of the present investigation is to increase the healthy benilites of yoghurt by adding chufa milk with different amounts and utilization of this yoghurt for cake making to improve its nutritional values and the sensory characteristics.

MATERIALS AND METHODS

Materials

Chufa tubers (*Cyperus Esculentus* L) obtained from Sugar Crops Research Institute, Agricultural Research Center, Giza, Egypt. Fresh buffaloe's milk was obtained from processing area of Food Tech., Res., Institute. Pure culture of *Streptococcus salivarius* sub sp. *themophilus* and *Lactobacillus delbrueckii* sub spp. *bulgaricus* were obtained from Chr- Hansens Laboratory Copenhagen, Denmark. The lacta 501 (stabilizer) was purchased from Milk products and Food Additives. Wheat flour (72% extraction rate) was obtained from the Egyptian millers Company. Eggs, Baking Powder, Vanillin, and Sugar were purchased from the local market.

Methods:

1- Preparation of chufa milk (horchata).

Chufa tubers were soaked until the rootlet appears (1mm). Water was added to the germinated seeds at ratio of 4 : 1 and blended using a mixture machine, then drained in muslin cloth to remove fibers. The filtrate was considered as the chufa milk (horchata).

2- Preparation of yoghurt:

Buffaloe's milk was standardized to 4.1% fat, the homogenized chufa suspension was added to substitute 15, 25, 50 and 75% of milk. The mixtures were heat treated, when the temperature of the mixture reached to 70°C, stabilizer (lacta 501) was added at ratio of 0.5% and the heat treatment completed to 98°C for 10 min then cooled immediately to 40°C. Active starter culture (3% w/w) was added mix gently. Dispense the inoculated mixture into appropriate leaded cups.

The cups then incubated at 40 ± 1°C for 2-3 hr until coagulation. Yoghurt samples were stored in refrigerator at 5°C until analysis.

3-Cake preparation:

Low fat cakes were prepared according to Abd El Motaleb (1995) as follows using the prepared yoghurt of different treatments.

Table (1): Low fat cake formula.

Ingredients	Wight (gm)	%
Flour	200	36.40
Sugar	80	14.6
Yoghurt (zabadi)	150	27.30
Fresh whole eggs	106	19.7
Baking Powder	9	1.63
Vanillin	2	0.73
Total	547	100

The procedure adopted was as follows:

(1) Flour and baking powder were sived together.
(2) The yoghurt was mixed with sugar using a mixing machine at low speed for 1 min.
(3) Eggs were beaten by electric whip and vanillin was added to the beaten eggs.
(4) Egg-vanillin mixture was added gradually to the yoghurt sugar mixture and the mixture was mixed at medium speed for 2 min.
(5) The flour mixture was added gradually to the sugar-yoghurt-eggs mixture and were beaten for 3mins.
(6) Five hundred grams of final mixture was put in a pan of 26cm diameter.
(7) The cake was then placed in oven and baked at 180°C for 35 mins.
(8) The cake was removed from the pan and allowed to cool 30 min at a wire rack before cutting, then cut with sharp knife and subjected to penal test.

4-Chemical Analysis:

The prepared yoghurt and cake samples were analyzed for total solids (T.S), fat, protein, ash and fiber according to the methodology of A.O.A.C (1990). Total carbohydrates were determined according to Montagomery (1961). pH values were measured as recorded by Ling (1963). Acetaldehyde and diacetyl were determined as described in Less and Jago (1969) and (1970), respectively.

5-Rheological properties:

Syneresis and curd tension of the yoghurt were measured according to the methods described by Abd El-Salam *et al.*, (1991) and Ahmed (1997), respectively Physical properties of cake, the weight, volume, height and specific volume were measured according to the method described by Abou El Soud (2004)

6- Microbiological examination:

The prepared yoghurt samples were examined microbiologically for total bacterial count, mold & yeast count, and coliform group according to A.P.H.A. (1992). Lactic acid bacterial count according to Samona and Robinson (1991).

7- Sensory evaluation:

The resultant yoghurt was orgaboleptically examined according to El Etriby *et al.*, (1997) when fresh, 7 and 14 days.

Fresh cakes quality (general appearance, crust color, crumb color, grain texture, softness, flavour and taste) was evaluated according to the method described by Abd El-Salam (2002).

RESULTS AND DISCUSSIONS

1. Chemical composition of raw materials used in yoghurt making:

Data presented in Table (2) showed the chemical composition of chufa and buffaloe's milk. Chufa milk had higher carbohydrates (10.18%) content than the buffaloe's milk (5.3%), however, it contained lower values of protein and ash. The total solids and fat chufa milk were more or less similar to buffaloe's milk 15.4% and 4.0%, respectively. The obtained results are in agreement with Abd El Rahman and Hassen (2004).

Table (2): Chemical composition of buffaloes milk and chufa milk.

Contents (g/100g samples)	Buffaloe's milk	Chufa milk
Total solids	15.21	15.41
Fat	4.00	4.00
Protein	4.90	0.89
Carbohydrates	5.30	10.18
Ash	0.95	0.33

2- Chemical composition of yoghurt during storage:

Data presented in Table (3) showed the effect of chufa substitution on the chemical composition of yoghurt during the refrigerated storage. The data indicate that chufa substitution levels slightly affected the total solids and fat as they ranged from 15.15 to 15.41% and 4.25 to 3.80%, respectively. The total solids and fat showed slight increase as a result of cold storage. Protein and ash decreased in parallel with chufa substitution level. As expected, total carbohydrates increased in a parallel with chufa substitution level and decreased during storage, this decrease may be due to fermentation by the starter or loss of some decomposed volatile compounds. The obtained results were in a harmony with that obtained by Basyony *et al.*, (2002).

Looking at the changes in pH values of fortified yoghurt made with chufa milk during the storage period presented in Table (3), pH values slightly affected by chufa substitution levels and cold storage period. The obtained data were in accordance with those of Azzam (1992).

Table (3): Chemical composition of fortified yoghurt as affected by chufa milk substitution during cold storage.

Contents g/100g samples	Storage period (days)	Chemical composition				
		Control	Yoghurt made from buffaloe's milk with chufa milk at ratio of			
			15%	25%	50%	75%
Total solids	Fresh	15.15	15.19	15.27	15.38	15.41
	7	15.32	15.39	15.41	15.49	15.52
	14	15.41	15.48	15.52	15.61	15.68
Fat	Fresh	4.25	4.10	3.9	3.9	3.80
	7	4.20	4.30	4.10	4.10	4.00
	14	4.30	4.30	4.30	4.20	4.10
Protein	Fresh	5.12	4.46	4.10	3.17	2.09
	7	5.31	4.59	4.30	3.35	2.16
	14	5.41	4.71	4.43	3.62	2.32
Carbohydrates	Fresh	4.90	5.74	6.44	7.69	9.06
	7	4.45	5.22	5.93	7.12	8.58
	14	4.28	5.08	5.54	6.63	8.32
Ash	Fresh	0.98	0.89	0.77	0.62	0.46
	7	1.36	0.95	0.82	0.72	0.58
	14	1.12	1.09	0.85	0.76	0.64
PH	Fresh	4.38	4.29	4.24	4.02	3.9
	7	4.15	4.01	4.05	3.85	3.71
	14	4.01	3.92	3.87	3.78	3.56

Control: Yoghurt made from buffaloe's milk 4% fat.

With regards to acetaldehyde and diacetyl Data presented in Fig. (1) show that acetaldehyde and diacetyl contents were higher in control than all treatments. During storage, diacetyl content increased during the first 7 days of cold storage, followed with significant decrease. This would mostly be due to slow reduction of diacetyl to acetoin (Driessen & Puhan 1988). Acetaldehyde content gradually decreased during the storage, this decrease in acetaldehyde content presumably due to the demonstrated ability of numerous lactic organisms to reduce the acetaldehyde to ethanol or oxidize it to acetic acid Salama (1993).

3-Rheological properties:

Table (4) revealed that wheying-off slightly affected by substitution level of chufa milk, a slight decrease was found due to substitution with chufa milk. On the other hand, wheying –off showed a decrease during the cold storage. On the contrary, curd tension result were in opposite trend with wheying-off. This could be explained by the ability of chufa milk protein and carbohydrates to absorb the moisture during storage period, and in parallel, increased the penetration value and decreased the wheying-off or syneresis of the yoghurt (Basyony *et al.*, 2002).

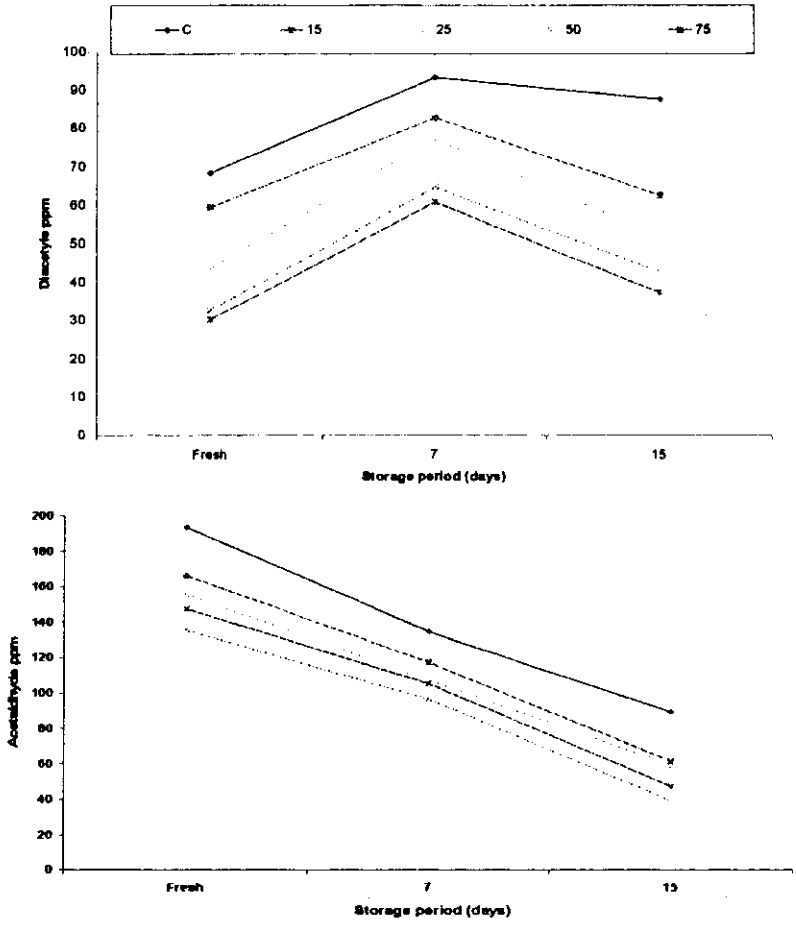

Fig (1): Diacetyle and acetaldehyde of yoghurt- like as affected by Chufa milk substitution during cold storage

Table (4): Rheological evaluation of fortified yoghurt during cold storage as affected by chufa milk substitution.

Rheological evaluation	Storage period (days)	Control	Yoghurt made from buffaloe's milk with chufa milk at ratio of			
			15%	25%	50%	75%
Curd tension mm	fresh	32.0	28.0	25.0	21.0	11.0
	7	33.0	30.0	27.0	24.0	14.0
	14	35	32.0	30.0	28.0	20.0
Wheyin-off (ml/100ml)	fresh	3.97	3.68	3.54	3.42	2.74
	7	3.58	3.42	3.36	3.25	2.53
	14	3.21	3.12	3.07	2.91	2.31

Control: Yoghurt made from buffaloe's milk 4% fat.

4-Microbiological evaluation:

As shown in Table (5) total bacterial and lactic acid bacterial counts increased in the control than all the treatments. Upon storage, these counts slowly increased and reaching its maximum after 7 days of cold storage then decreased. It is well established that lactic acid bacteria counts in treatments are directly related to the acid development in this product due to its inhibition (Roushdy *et al.*, 1996). Yeast & mould showed the low count in the fresh control which increased as a result of substitution level of chufa milk this may be due to post contamination during the storage. During the cold storage, yeast & mould increased. On the other hand, coliforms were not detected in all treatments.

Table (5): Microbiological analysis of fortified yoghurt during cold storage as affected by chufa milk substitution.

Microbial groups	Storage period (days)	Control	Yoghurt made from buffaloe's milk with chufa milk at ratio of			
			15%	25%	50%	75%
Total count cfux10^8	fresh	56	37	23	15	13
	7	82	58	48	36	34
	14	34	21	31	17	13
Lactic acid bacteria cfux10^8	fresh	37	25	18	10	7
	7	73	52	40	32	23
	14	31	18	21	14	10
Mould & Yeasts (cfux10^2)	fresh	1	2	2	4	2
	7	3	5	3	7	5
	14	6	7	5	8	6
Coliforms	fresh	ND	ND	ND	ND	ND
	7	ND	ND	ND	ND	ND
	14	ND	ND	ND	ND	ND

5-Sensory evaluation:

Scores of sensory evaluation of yoghurt were presented in Table (6). Scores of organoleptic properties (flavour, body and texture, appearance, acidity and total scores) followed similar trends. The control yoghurt gained the highest score either when fresh or throughout storage periodes. Scores of sensory evaluation decreased by increasing chufa milk substitution level resulted in slightly darker color and the texture became softer and smoother at 75% chufa milk.

6- Chemical composition of cup cake:

From the results present in Table (7) was noticed that the effect of fortified yoghurt samples on the chemical composition of cakes increased the total carbohydrate. This may be due to the high level of chufa milk which have high carbohydrates content. While, cup cake with fortified yoghurt with chufa milk was high in protein.

Regarding to the data in the same table showed an increase in ash and crude fiber contents in cup cakes containing different levels of chufa milk compared with the control, these increase may be due to the high ash and crude fiber contents of chufa milk. The obtained were results in the same line with those reported by El Said *et al.*, (1990).

Table (6): Sensory evaluation of fortified yoghurt during cold storage as affected by chufa milk substitution.

Sensory evaluation	Storage period (days)	Control	Yoghurt made from buffaloe's milk with chufa milk at ratio of			
			15%	25%	50%	75%
Flavor (45)	Fresh	43	40	38	35	27
	7	42	38	35	32	23
	14	39	37	32	30	25
Body & texture (30)	Fresh	30	28	25	24	18
	7	28	25	23	21	15
	14	27	23	21	20	13
Acidaty (10)	Fresh	10	9	9	8	8
	7	8	7	7	6	6
	14	7	6	5	4	5
Appearance (15)	Fresh	14	12	11	11	10
	7	14	12	10	10	9
	14	13	11	9	8	8
Total (100)	Fresh	97	90	83	78	63
	7	92	82	75	69	53
	14	86	77	67	62	51

Control: Yoghurt made from buffaloe's milk 4% fat.

Table (7): Chemical composition of cup cake made with fortified yoghurt.

Chemical composition	Control	Cup cake made from yoghurt with chufa milk at ratio of			
		15%	25%	50%	75%
Protein	10.90	1018	1012	10.09	10.3
Crude fiber	1.82	1.80	1.91	2.28	2.40
Ether extract	17.91	18.03	17.25	17.04	16.00
Ash	2.10	2.12	2.31	2.40	2.50
Carbohydrates	67.27	66.37	67.59	67.50	67.62

Control : Cup cake (low fat cake formula).

7-Physical properties of cakes.

The physical properties of cakes were determined for weight, volume, height and specific volume. Results in Table (8) showed that volume, height and specific volume were decreased with increasing the ratio of fortified yoghurt with chufa milk. Cup cake which contain 15% of this yoghurt was approximately the same as the control in specific volume.

8-Sensory evaluation of cakes.

Laboratory prepared cup cake samples were baked and the sensory evaluation were done for (appearance, color, odor, texture and taste). From data presented in Table (9) it was clear that fortified yoghurt with chufa milk 15% gave the highest value and the total scores were high of all of the tested cup cakes, which contain 15% yoghurt chufa milk.

Table (8): Effect of fortified yoghurt on the physical properties of cup cakes.

Physical properties	Control	Cup cake made from yoghurt with chufa milk at ratio of			
		15%	25%	50%	75%
Weight	58.50	60.46	60.96	62.81	64.65
Volume	145	145	130	122	118
Height	6.04	6.00	5.90	5.81	5.85
Specific volume	2.47	2.40	2.13	1.94	1.82

Control : Cup cake (low fat cake formula).

Table (9): Sensory evaluation of cup cake made with fortified yoghurt.

Sensory evaluation	Control	Cup cake made from yoghurt with chufa milk at ratio of			
		15%	25%	50%	75%
General appearance	14.03	13.86	13.91	12.01	11.67
Crust color	14.95	14.31	14.02	13.92	13.79
Soft ness	14.91	13.89	13.70	13.51	13.40
Texture	14.14	14.61	14.68	13.48	13.22
Flavor	10	9.02	9.90	8.40	8.00
Taste	30	27	26	24	21
Overall acceptance	98.03	92.69	92.21	85.32	81.08

Control : Cup cake (low fat cake formula).

CONCLUSION

From such a study it could be concluded that it is possible to make good quality fortified yoghurt from buffaloe's milk and chufa milk at level 25% without any defects. Cup cake was prepared from such product successfully gave the best results for physical properties, sensory evaluation and chemical composition.

REFERENCES

A.O.A.C. (1990): Official Methods and Analysis 15th Ed. Associzio of Official Analytical Chemists Inc. Arlington, Virginia. U.S.A.

A.P.H.A. (1992): Standard methods for the examination of dairy products. American Public Health. Assoc. Inc. 16th Ed. Washington D.C.

Abd El Motaleb, N. M. (1995): Preparation and isolation of some food for El DErly people M.Sc. Thesis. M.Sc. of Agric. Cairo Univ., Egypt.

Abd El Rahman, H.A. and Hassen, N.A. (2004): The production of a new ice milk. Egyption J. of Agric Res. Center, 82, 3, 191 - 203.

Abd El Salam, M.H.; El-Shibiny, S.; Mahfouz, M.B.; El-Atriby, H.M. and Antila.V. (1991): Preparation of whey protein concentration from salted whey and its use in yoghurt. J. of Dairy Research 58: 503.

Abd El-Salam. Th. M.(2002): Biochemical studies on some peanut products. Ph. D. Thesis, Fac. of Agric.. Cairo University. Egypt.

Abou El Soud. H. H. (2004): Physical, chemical and biological studies on some bakery products supplemented with soybean products. M.Sc. Thesis. Fac. of Agric., Cairo Univ., Egypt.

Ahmed, A.G. (1997): Chemical and microbiological studies on processed cheese. M.Sc. Thesis, Fac.of Agric., Ain Shams, Univ., Egypt

Azzam, M.A.E.K. (1992): Studies on some chemical and microbiological properties of soybean milk. M.Sc. Thesis, Fac. of Agric. Cairo Univ., Egypt.

Basyony, A.E.; Abd El Rahman, H.A. and Assem N.H.A. (2002): Production of yoghurt like using Hull. Less barley as a substitution material. 4th International Conference for Food Industries Quality Control 617-636.

Coskumer Y.; Ercan, R.; Karababa, E. and Nazlican, A. (2002): Physical and chemical properties of chufa (cyperus esculentusl) tubers grown in rhe cukurova region of Turkey. J. Sci. Food Agric. 82: 625-631.

Driessen, F.M. and Puhan, Z. (1988): Technology of mesophilic fermented milk. IDF Bull, 75, 227.

El Etriby, M.M.; El-Dalrouty, R.K. and Zaghloul A.H. (1997): Physicochemical and bacteriological studies on mango yoghurt manufactured from ultrafiltrated milk retentate using glucono delta lactone (GDL). Egyptian J. Dairy Sci. 25: 349-365.

El Said, A., El Barding, A., El Saged B. M. S. and Attia, T. (1990): Technological studies on high hiber cake.Bull. Nutr. Inst. Cairo, Egypt. 10, 4.

Less, G. J. and Jago. C.R. (1969): Methods for the estimation of acetaldehyde in cultured dairy product. Aust. J. Dairy Technol., 24, 181.

Less, G.J. and Jago, G.R. (1970): The estimation of diacetyl in the presence of other carbongl compounds. J. Dairy Res. 37, 129.

Ling. E.R. (1963): A text Book of Dairy Chemistry Vol 2, 3rd. Ed. Chapman and Hall. Ltd. London New York.

Linssen, J.P.H; Kielman. G.M.; Cozijnsen, J. L. and Pilnik. W. (1988): Comparison of chufa and olive oils. Food Chem. 28:279-285.

Mokady. SH. and Doley, A. (1970): Nutritional evaluation of tubers of *Cyperus Esculentus* L. J. Sci. Fd. Agric., vol 21 April. 211-214.

Montagomery, R. (1961): Further studies of phenol sulphuric acid reagent for carbohydrates. Biohys. Acta 48: 591.

Pascual, B.; Maroto.V.J.; Galarza, S.L.; Sanbutista, A. and Alagarda, J. (2000): Chufa (*Cyperus Esculentus* L. var. Sativus Boeck.) an unconventional crop. Studies related to application and cultivation.Economic Botany 54 (4) 439-448.

Rizkalla, S.W.; Luo, G., Kabir, M.; Chevalier, A.; Pacher, N. and Salama, G. (2000): Chronic consumption of fresh but not heated yoghurt improve breach-hydrogen status and short chain status acid profiles controlled study in health men with or without lactose maldigestion. Am. J. Clin. Nutr. 12, 1474 - 1479.

Roushdy, I.M.; Ali, A.A. and El-Kenany, Y. M. (1996): Production of acidophilus and bifidus butter milks from buffaloe's milk Egypt J Food Sci., 24, 2, 233-246

Salama, F.M.M. (1993): Chemical and organoleptical properties of biogarde. Like product made from lactose hydrolysed milk. Egyptian. J. Dairy. Sci.,21, 273.

Samona, A. and Robinson P.K. (1991): Emumeration of bifidobacterin in dairy products. J. of the Sac. Of Dairy. Technol 44, (3) August.

إنتاج يوجهورت معدل باستخدام لبن حب العزيز والاستفادة منة فى إنتاج الكيك

ايهاب عبد الباقى يوسف عيسوى ، نادية حسنى على عاصم ،
هالة عبد المنعم عبد الرحمن
معهد بحوث تكنولوجيا الأغذية ــ مركز البحوث الزراعية

فى هذا البحث تم استخدام لبن حب العزيز فى أنتاج يوجهورت من لبن جاموسى ٤% دهن وتم تحضير اربع معاملات حيث تم استبدال اللبن الجاموسى بلبن حب العزيز بنسب ١٥، ٢٥، ٥٠، ٧٥% .هذا بجانب معاملة الكنترول المصنعة بالطريقة التقليدية من اللبن الجاموسى ٤% دهن وتم تخزين كل المنتجات فى الثلاجة لمدة ١٤يوم. وتم إجراء الاختيارات الكيميائية والريولوجية والميكروبيولوجية والحسية وهى طازجة وبعد٧ و١٤يوم على التوالى. وقد اظهرت نتائج التركيب الكيماوى لعينات اليوجهورت المختلفة انها توافق مع العينة الكنترول فى كلا من الدهن والمواد الصلبة الكلية ، إما بالنسبة للبروتين والرماد فقد اخفضا بزيادة معدلات الاستبدال بلبن حب العزيز عن الكنترول ولكن ارتفعت معدلات الكربوهيدرات الكلية بزيادة الاستبدال بلبن حب العزيز كما انخفضت اثناء التخزين . قيم الاسيتالدهيد والداى استيل وpH كانت اكثر تاثرا اثناء التخزين على مستويات الاستبدال كلها . ارتفعت معدلات الاختراق وانخفض الشرش المنفصل بزيادة معدلات الاستبدال بلبن حب العزيز . واوضحت نتائج الخواص الحسية ان زيادة معدلات الاستبدال الى ٧٥% ادى الى قوام ولون غير مرغوب ولكن كان افضل معدل للاستبدال وانتج يوجهورت جيد فى الطعم و القوام هى نسبة استبدال ١٥، ٢٥% من اللبن الجاموسى.

هذا وقد تم استخدام الزبادى الناتج فى صناعة الكيك .واظهرت نتائج التحليل الكيماوى والحسى والريولوجى بانة يمكن تصنيع كيك جيد الخواص باستخدام يوجهورت بنسبة استبدال ١٥% من لبن حب العزيز فى الخواص الريولوجية والحسية ولكن كان التاثير طفيفا فى التركيب الكيماوى عن معاملة الكنترول.