J.Food and Dairy Sci., Mansoura University, Vol.1(11): 725 - 733, 2010

THE USE OF DIFFERENT TYPES OF SKIM MILK POWDER IN MAKING YOGHURT FROM GOAT'S MILK

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ABSTRACT

Goat's milk yoghurt (GMY) was manufactured without (the control) or with fortification of milk with cow's skim milk powder (CSMP) or goat's skim milk powder (GSMP) to 14 and 16 % TS content.

Gross chemical composition and some properties of the fresh and stored yoghurt were affected by both amount and type of SMP used. The use of GSMP mostly increased the values of TS, carbohydrate, acidity and acetaldehyde and decreased the values of fat, protein, ash and TVFA when compared with the corresponding values of yoghurt made with CSMP.

Curd tension (CT) was significantly increased when GSMP was used and the highest CT values were correlated with the minimum curd syneresis (CS). The control yoghurt had the lowest CT and the highest CS values.

Fortification of GM with SMP was quite important to improve the sensorial properties of the resultant yoghurt. The use of GSMP enhanced the specific flavour of Goat's milk in the product, whereas CSMP overcome such flavours. This was the main goal of the present study to meet the different desires of the consumers.

INTRODUCTION

Goat's milk (GM) in Egypt ranks the third after buffalo's milk and cow's milk (CM) and in the last twenty years, studies on GM became a matter of wide interest especially after the efforts done by governmental and private sectors to improve milk production from the local goat's breeds. GM is often sought for its perceived health benefits and unique taste that make it attractive for some consumers. Additionally, it was reported that it is easier to digest than CM and may have certain therapeutic values (Park, 1994; Haenlein, 2004).

On the other hand, it is well know that GM is similar in the basic composition to CM, but some important differences exit in the protein and fat structures that make people who have allergies to CM can often drink GM and the fat globules in GM stay in suspension longer which leads to the perception of natural homogenization.

GM contains less α_{s1}-casein and more β-casein than CM and richer in some amino acids like aspartic acid, histidine, threonine, methionine and phenylalanine and in some fatty acids like caproic, caprylic, lauric and myristic acid (Sarkar and Misra, 2006). Also, the mineral content of GM is considerably higher than CM since it contains more calcium, phosphorus, potassium and magnesium (Posecion, 2001).

Such significant differences beside differences in the size of casein micelle and fat globules could lead to the milk behaving differently during processing. In this respect, Tamime and Robinson (1999) reviewed some suggested processes employed during the manufacture of yoghurt from GM whereas, the potential of this milk for yoghurt manufacture was recently given in details by Sarkar and Misra (2006).

The aim of the present study was to follow composition and quality of yoghurt made from GM as affected by fortification with skim milk powder (SMP). Type of SMP was taken into consideration in this respect since cow's SMP or goat's SMP was used for fortification process.

MATERIALS AND METHODS

Fresh goat's milk (GM) was collected from the herd of Sakha Exp. Station, Anim. Prod. Res. Inst., Min. of Agric., whereas cow's skim powder (CSMP) and goat's skim powder (GSMP) were obtained from BBA (Lactalis Industries, France and Covalact Factory, Covasna, Romina, respectively).

Yoghurt starter (DVS) consisting of *Streptococcus thermophilus* and *Lactobacillus delbrueckii subsp. bulgaricus* (YC-X11) was obtained from Chr. Hansen's Lab., Denmark.

The traditional method of making yoghurt was followed (Tamime and Robinson, 1999) after fortification of GM with CSMP or GSMP to increase the TS content to 14 and 16%, whereas the control yoghurt was manufactured from GM without any fortification. Three replicates were carried out in this respect.

The resultant yoghurt was analysed when fresh and after storage for 7 days at 5±1°C for the following: TS, fat, protein, (TN x 6.38), acidity and pH as described by Ling (1963), ash as recommended in AOAC (1984), whereas carbohydrate content was calculated using the following equation:

Carbohydrate = TS - (Fat + Protein + Ash). Total volatile fatty acids content (TVFA) was measured as given by KosiKowiski (1978) whereas, acetaldehyde was determined by the method of Less and Jago (1969).

The energy values express as KJ/1000g was calculated using the following equation

given by Walstra and Jenness (1984):

$E = 370 F + 170 P + 168 L + 18$

Where:

E= Total energy (kJ/kg)

F= Fat content (%)

P = Protein content (%)

L = Lactose or carbohydrate content (%).

The resultant yoghurt was also analysed for curd tension (CT) and Curd Synersis (CS) as given by Chandrasekharra, *et al.* (1957) and Mehanna and Mehanna (1989) respectively.

The organoleptic properties were evaluated by 10 panelists from the staff members of Dairy and Food Sci. departments. Fac. Agric., Kafr El-Sheikh Univ. using scoring card recommended by El-Shibiny *et al*. (1979).

Statistical analysis of the data was done using the analysis of variance (ANOVA) of SPSS program, version 10.5.0. Means with significant differences were compared by Duncan's multiple range tests (SPSS, 1998)

RESULTS AND DISCUSSION

Table (1) reveals the gross chemical composition of goats milk yoghurt (GMY) made from goat's milk (GM) fortified with cow's skim milk powder (CSMP) or goat's skim milk powder (GSMP) to increase the calculated total solids (TS) content to be 14 and 16% in the prepared GM.

TS content significantly increased in the experimental yoghurt compared to the control one which prepared from GM. Such increase could be explained on the basis of adding more SNF whilst it's type significantly affected TS content in case of trials of 14% TS content. Such differences in TS than the calculated ones may be due to different solubility and other properties of SMP used beside impact of processing conditions. TS content in all samples increased in the stored yoghurt; that may be due to evaporation of water during storage period and also to the changes occurred in the curd to be more compact and firmer. However, such changes are in agreement with the results given by Mehanna *et al.* (1988) and Sakr (2004).

Significant differences in fat content of fresh yoghurt were recorded as affected by both amount and type of SMP added. This may be due to varying of fat content in the SMP. Furthermore, the pecularities of goat's milk fat and lipolysis system (Chilliard *et al.* 2003) could have some effect in this respect. Storage of the prepared yoghurt had the same increasing impact on fat content as previously mentioned for TS and could be explained on the basis of the corresponding loss of moisture.

Protein content (Table 1) followed the same trend of fat being significantly higher in fortified yoghurt and increased with increasing the amount of SMP added, whereas the same changes were occurred during storage. Richness of SMP added with protein may be the main factor in such increase in protein content, whereas loss of moisture during storage of yoghurt was responsible for the recorded impact of storage.

This trend of results was expected since addition of protein source like SMP should increase the protein of the final product. This agrees with that given by Sakr (2004) whereas type of SMP added seems to have no impact in this respect.

Ash content (Table 1) of fresh yoghurt was not significantly affected by increasing TS to 14% or by type of SMP added, whereas a significant increase was observed when TS was increased to be 16%. However, the control yoghurt had relatively less ash than the experimental samples. Impact of storage was the same as given for the other prementioned constituents and may be attributed to the same reason written elsewhere. The increase in ash of fortified yoghurt milk was responsible for the corresponding increase in the resultant yoghurt. This agrees with the results given by Sakr (2004).

The control yoghurt (Table 1) had higher carbohydrate than that made with adding CSMP at any given ratio whereas adding GSMP increased the carbohydrate content in fresh and stored yoghurt. According to different studies in the literature, Singh *et al.* (1992) reported higher carbohydrate in goat's milk than cow's milk and the fermentation rate was greatly different during yoghurt making. This may explain the recorded differences in carbohydrate content in the present study, which was calculated by difference as mentioned before.

Table (1): Chemical composition and energy value of fresh and stored yoghurt made from goat's milk fortified with different types of skim milk powder*

Storage (days)	Control	Levels of total solids			
		14%		16%	
		CSMP	GSMP	CSMP	GSMP
Total Solid, %					
0	12.81 ±0.01^{A}	13.76 ±0.16^{B}	14.50 ±0.10^{C}	14.94 ±0.06^{CD}	15.09 ±0.19^{D}
7	12.95 ±0.15^{A}	14.15 ±0.05^{B}	15.24 ±0.16^{C}	15.55 ±0.22^{C}	15.75 ±0.15^{C}
Fat, %					
0	3.71 ±0.01^{A}	4.44 ±0.03^{D}	4.00 ±0.00^{B}	4.36 ±0.06^{D}	4.20 ±0.00^{C}
7	3.52 ±0.01^{A}	4.67 ±0.16^{B}	4.60 ±0.40^{B}	5.05 ±0.05^{B}	4.45 ±0.45^{AB}
Protein, %					
0	3.51 ±0.00^{A}	5.06 ±0.07^{CD}	4.46 ±0.08^{B}	5.23 ±0.03^{D}	4.92 ±0.00^{C}
7	3.75 ±0.24^{A}	5.16 ±0.02^{D}	4.27 ±0.12^{AB}	4.99 ±0.00^{CD}	4.51 ±0.28^{AB}
Ash, %					
0	0.75 ±0.01^{A}	0.83 ±0.01^{AB}	0.81 ±0.00^{AB}	0.92 ±0.06^{B}	0.92 ±0.07^{B}
7	0.87 ±0.02^{AB}	0.90 ±0.01^{AB}	0.83 ±0.01^{A}	1.21 ±0.03^{C}	1.04 ±0.11^{BC}
Carbohydrate, %					
0	4.85 ±0.01^{BC}	3.43 ±0.25^{A}	5.23 ±0.02^{C}	4.44 ±0.08^{B}	5.05 ±0.26^{BC}
7	4.82 ±0.40^{BC}	3.42 ±0.24^{A}	5.55 ±0.37^{C}	4.31 ±0.25^{B}	5.76 ±0.08^{C}
Energy, KJ/1000g					
0	2799.5 ±1.01^{A}	3096.4 ±18.16^{B}	3134.8 ±16.96^{B}	3263.5 ±11.16^{C}	3256.8 ±43.68^{C}
7	2765.8 ±28.3^{A}	3197.7 ±22.3^{B}	3376.6 ±106.2^{B}	3458.04 ±22.7^{B}	3398.0 ±133.2^{B}

***CSMP= Cow 's skim milk powder, GSMP= Goat's skim milk powder.**
Data are means ±SE for 3 replicates.
$^{A, B, C}$ Means with unlike superscripts are significantly different (*P*< 0.05)

In general, the differences in the gross chemical composition of yoghurt due to using different SMP could be explained on the basis of the recorded differences in composition and properties of cow's and goat's milk that reviewed in details by Singh *et al.* (1992) and Hatem (2003). However, the changes- on storage- are in agreement with the trend given by Eissa *et al.* (2010) who reported that storage of goat and cow milk yoghurt for 5days significantly increased fat, protein, ash and TS, whereas further increase in fat, ash and TS was observed after 15 days of storage. Proteins and moisture significantly decreased after 15 days of storage.

The energy values expressed as KJ/100g of fresh and stored yoghurt are given in Table (1). As expected the recorded values increased with increasing the amount of SMP added. Type of SMP had insignificant effect, whilst all the values increased with advancing storage period. In the literature, wide variations in this respect were recorded. This could be explained on the basis of variations of the chemical composition of yoghurt especially fat content. Walstra and Jenness (1984) mentioned that milk lipids average 37 KJ/g and individual triglycerides vary in energy content with length of fatty acid chains.

The slight increase in energy values due to storage of the experimental yoghurt could be due to the corresponding increase in fat and SNF contents that occurred via loss of moisture by evaporation.

As a result of increasing TS in yoghurt milk, the acidity of the resultant yoghurt increased (Table 2). This agrees with the finding of Walstra and Jenness (1984) who attributed such increase to the buffering action of the additional proteins, phosphates, citrates, lactates and other miscellaneous milk constituents.Tamime and Robinson (1999) demonstrated that the natural and titratable acidity of yoghurt were gradually increased by increasing TS content of yoghurt milk from 12% to 14, 16, 18 and 20% using full cream milk powder. It seems from the recorded acidity figures that type of SMP used had no significant effect in this respect, whereas all values slightly increased on storage.

The pH values (Table 2) followed an opposite trend of acidity results being higher in the control yoghurt and lower in the stored samples, whereas the same insignificant effect of SMP type was observed.

Impact of adding SMP on acidity and pH agrees with the finding of El-Sheikh (2001), whereas the changes during storage are in accordance with the trends given by El-Sheikh (2001), Sakr (2004) for cow's milk yoghurt and by Eissa *et al.* (2010) for both cow's and goat's milk yoghurts.

The flavour components of fresh yoghurt including TVFA and acetaldehyde (Table 2) seem to be not affected significantly by the amount or type of SMP added. The control fresh yoghurt had the highest values in this respect. In case of the stored yoghurt, the differences in TVFA content were insignificant, whereas acetaldehyde was the maximum in the control yoghurt and the differences in its content were insignificant between the experimental samples.

Table (2): Acidity, pH and some flavour components of yoghurt made from goat's milk fortified with different types of skim milk powder*

Storage (days)	Control	Levels of total solids			
		14%		16%	
		CSMP	GSMP	CSMP	GSMP
Acidity, %					
0	0.36 ±0.01^{A}	0.43 ±0.03^{B}	0.43 ±0.00^{B}	0.47 ±0.01^{BC}	0.50 ±0.02^{C}
7	0.42 ±0.00^{A}	0.45 ±0.01^{B}	0.48 ±0.00^{C}	0.49 ±0.00^{C}	0.51 ±0.01^{D}
pH					
0	4.75 ±0.02^{B}	4.70 ±0.01^{AB}	4.61 ±0.01^{A}	4.63 ±0.01^{A}	4.67 ±0.05^{AB}
7	4.54 ±0.00^{B}	4.49 ±0.03^{AB}	4.41 ±0.05^{A}	4.52 ±0.02^{AB}	4.56 ±0.06^{B}
TVFA (ml 0.1N NaOH /100g)					
0	4.20 ±0.60^{A}	4.00 ±0.00^{A}	4.00 ±0.00^{A}	4.00 ±0.40^{A}	3.80 ±0.20^{A}
7	4.00 ±0.00^{A}	4.80 ±0.00^{A}	4.60 ±0.60^{A}	4.28 ±1.08^{A}	4.00 ±0.00^{A}
Acetaldehyde (ų mole/100 g)					
0	24.45±1.55^{B}	17.74±1.54^{AB}	22.17±4.71^{B}	15.04±2.21^{AB}	10.96±2.96^{A}
7	13.78±0.23^{B}	8.30±1.71^{A}	10.23±1.95^{AB}	8.09±1.84^{A}	7.50±0.50^{A}

*** See legend to Table (1) for details.**

TVFA increased during storage of all samples whereas the corresponding values of acetaldehyde decreased. The increase in TVFA on storage or even their presence in the fresh samples agree with the trend given by Sakr (2004) and could be due to lipolytic activity of yoghurt starter during processing and storage of yoghurt (Tamime and Robinson 1999). In accordance with the present results, Mehanna and Hefnawy (1990) demonstrated that acetaldehyde content in zabady gradually increased up to the first six days of storage and decreased afterthat, whereas Tamime and Robinson (1999) reviewed that losses of acetaldehyde from yoghurt after storage for 24 hours are dependent on the type of milk used for processing. However, production of acetaldehyde becomes evident only at certain level of acidification (pH 5), reaches a maximum at pH4.2 and stabilizes at pH 4 (Tamime and Robinson, 1999).

Curd tension (CT) was significantly increased in yoghurt when GSMP was used at any fortification level (Table 3), whereas the higher was SMP added, the higher were the CT values. Such improving in CT due to TS content agrees with the finding of Sarkr (2004).

The highest CT values of fresh yoghurt made from milk fortified with GSMP at 16% TS level were correlated with the minimum values for curd syneresis (CS) at any given syneresis time (Table 3), whereas the stored control yoghurt had always higher corresponding CS values.

Table (3): Curd tension and curd syneresis of fresh and stored yoghurt made from goat's milk fortified with different types of skim milk powder*

	Control	Levels of total solids			
		14%		16%	
		CSMP	GSMP	CSMP	GSMP
	Curd tension, g				
Fresh yoghurt	20.00 ±0.00^{A}	20.00 ±0.00^{A}	26.00 ±0.00^{C}	22.00 ±0.00^{B}	26.50 ±0.50^{C}
Stored yoghurt	18.02 ±0.00^{A}	19.00 ±0.00^{A}	23.50 ±3.50^{A}	20.00 ±0.00^{A}	42.10 ±2.90^{B}
	Curd syneresis, g/15g				
Fresh yoghurt					
Time (min)					
15	5.44 ±0.53^{D}	3.66 ±0.64^{CD}	3.11 ±0.88^{BC}	1.15 ±0.31^{AB}	1.01 ±0.01^{A}
30	6.28 ±0.52^{B}	5.50 ±0.10^{B}	4.95 ±0.83^{B}	2.95 ±0.22^{A}	2.97 ±0.24^{A}
60	6.57 ±0.55^{B}	5.94 ±0.04^{B}	5.94 ±0.55^{B}	4.11 ±0.11^{A}	3.83 ±0.26^{A}
90	6.62 ±0.48^{B}	6.04 ±0.09^{B}	6.46 ±0.38^{B}	4.90 ±0.06^{A}	4.15 ±0.20^{A}
180	6.50 ±0.48^{B}	6.06 ±0.01^{B}	6.89 ±0.08^{B}	5.94 ±0.19^{A}	4.45 ±0.34^{A}
Stored yoghurt					
Time (min)					
15	5.50 ±0.42^{B}	4.88 ±0.76^{B}	4.01 ±0.00^{AB}	2.81 ±0.22^{A}	3.08 ±0.08^{A}
30	5.84 ±0.50^{B}	5.21±0.78^{BC}	4.74 ±0.04^{ABC}	3.59 ±0.05^{A}	3.68 ±0.09^{AB}
60	5.96 ±0.36^{C}	5.45 ±0.60^{BC}	4.67 ±0.40^{ABC}	4.25 ±0.24^{AB}	3.92 ±0.29^{A}
90	6.02 ±0.33^{C}	5.54 ±0.64^{BC}	5.45 ±0.15^{ABC}	4.23 ±0.00^{A}	4.29 ±0.20^{AB}
180	5.87 ±0.35^{B}	5.42 ±0.61^{AB}	5.68 ±0.29^{AB}	4.74 ±0.32^{AB}	4.35 ±0.01^{A}

*** See legend to Table (1) for details.**

The sensorial evaluation (Table 4) reveals that the fortification process greatly improved appearance, firmness and smoothness of the fresh and stored yoghurt beside preventing wheying-off. The scores given for those properties were higher as compared to the control yoghurt. Mostly, type of SMP used in the fortification seems to have insignificant effect in this respect.

In the fresh yoghurt, the acid property was more pronounced in yoghurt with 16% TS that was more significant obvious in case of using GSMP. Insignificant differences were recorded in this respect for the stored yoghurt. Flat, foreign and unclean flavours were not detected in the fresh yoghurt from all treatments, which were ranked the maximum attainable scores being 10 out of 10 points. The corresponding stored samples ranked much less scoring points.

Table (4): Sensory evaluation of fresh and stored yoghurt made from goat's milk fortified with different types of skim milk powder*

Property	Control	Levels of total solids			
		14%		16%	
		CSMP	GSMP	CSMP	GSMP
Fresh yoghurt					
Appearance (10)	7.50 ±0.50^{A}	8.50 ±0.50^{AB}	9.00 ±0.00^{B}	8.00 ±0.00^{AB}	8.50 ±0.50^{AB}
Firmness (10)	4.25 ±0.25^{A}	7.50 ±0.50^{B}	8.25 ±0.25^{BC}	8.50 ±0.50^{BC}	9.00 ±0.00^{C}
Smoothness (10)	7.25 ±0.25^{A}	7.50 ±0.50^{AB}	8.00 ±0.00^{AB}	8.75 ±0.75^{AB}	9.00 ±0.00^{B}
Wheying off (10)	7.50 ±0.50^{A}	8.50 ±0.50^{AB}	8.75 ±0.25^{AB}	9.00 ±0.00^{AB}	9.50 ±0.50^{B}
Flavour (60)					
Acid (10)	9.50 ±0.50^{BC}	10.00 ±0.00^{C}	9.00 ±0.00^{BC}	8.00 ±1.00^{AB}	7.00 ±0.00^{A}
Bitterness (10)	8.50 ±0.50^{A}	9.50 ±0.50^{AB}	10.00 ±0.00^{B}	10.00 ±0.00^{AB}	9.00 ±0.00^{AB}
Flat (10)	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00^{B}	10.00 ±0.00
Foreign (10)	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00
Cooked (10)	8.50 ±0.50^{A}	10.00 ±0.00^{B}	9.00 ±0.00^{A}	10.00 ±0.00^{B}	10.00 ±0.00^{B}
Unclean (10)	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00
Stored yoghurt					
Appearance (10)	7.25 ±0.25^{A}	7.75 ±0.25^{AB}	8.00 ±0.00^{B}	9.00 ±0.00^{C}	10.00 ±0.00^{D}
Firmness (10)	4.50 ±0.50^{A}	5.50 ±0.50^{A}	7.50 ±0.50^{B}	9.00 ±0.00^{BC}	9.50 ±0.50^{C}
Smoothness (10)	7.50 ±0.50^{A}	8.00 ±0.00^{AB}	8.00 ±0.00^{AB}	9.00 ±0.00^{C}	8.75 ±0.25^{BC}
Wheying off (10)	6.50 ±0.50^{A}	9.00 ±0.00^{B}	9.00 ±0.00^{B}	9.75 ±0.25^{BC}	10.00 ±0.00^{C}
Flavour (60)					
Acid (10)	7.00 ±0.00^{A}	8.25 ±0.25^{B}	8.75 ±0.25^{B}	8.50 ±0.00^{B}	8.25 ±0.25^{B}
Bitterness (10)	9.00 ±0.00	9.00 ±0.00	9.00 ±0.00	9.00 ±0.00	9.00 ±0.00
Flat (10)	9.00 ±0.00	9.00 ±0.00	9.00 ±0.00	9.00 ±0.00	9.00 ±0.00
Foreign (10)	7.00 ±0.00^{A}	7.00 ±0.00^{B}	7.00 ±0.00^{C}	8.00 ±0.00^{D}	8.00 ±0.00^{E}
Cooked (10)	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00
Unclean (10)	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00	10.00 ±0.00

*** Average ± SE of 10 panelists**
***See legend to Table (1) for details.**

The attained improved texture properties (firmness and smoothness) as well as no wheying –off as affected by using GSMP are in accordance with the report given by Posecion (2001) who concluded according to different studies from the literature that GMY has a smoother texture as compared to that made from cow's milk (CMY) as well as distinctive sharp tangy taste.

Moreover, a distinct characteristic of GMY is the absence of syneresis whereas, CMY need to be stabilized and homogenized to prevent expulsion of the whey from the curd (Tamime and Robinson, 1999; Posecion, 2001).

In conclusion, fortification of goat's milk with goat's skim milk powder for making yoghurt makes it attractive to consumers who prefer taste and odour of goat's milk, whereas fortification with cow's skim milk powder gives opportunity to overcome such flavours which unpleasant for the others.

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دراسة على استخدام نوعين مختلفين من اللبن الفرز المجفف في تصنيع اليوجورت من لبن الماعز

ايمان محمد ابراهيم
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يفضل البعض لبن الماعز لفوائده الصحية و الغذائية العديدة ولهذا فقد اهتمت الدراسة بتصنيع اليوجورت من لبن الماعز وذلك بعد تدعيمه بجوامد اللبن الفرز عن طريق إضافة اللبن البقرى الفرز المجفف (أ) او لبن الماعز الفرز المجفف (ب) لرفع الجوامد الكلية في اللبن المعد للصناعه إلى ١٤ ,١٦% وذلك بهدف تحسين جودة اليوجورت الناتج من ناحية ومن ناحية أخرى التغلب على نكهة اللبن الماعز غير المحببة من قبل بعض المستهلكين (بالمعاملة أ) او زيادة وتقوية نكهة اللبن الماعز و التي يفضلها البعض الآخر (بالمعاملة ب).

أوضحت نتائج تحليل اليوجورت الطازج والمخزن لمدة سبعة ايام فى الثلاجة (٥ ±١°م) لتركيبة الكيماوي الإجمالي ولبعض خواصه الريولوجية و الحسية ما يلي:

١- تأثر تركيب اليوجورت فى الغالب وبعض خواصه سواء كان طازجا أو مخزنا بكمية ونوع اللبن الفرز المجفف المستخدم حيث أدى استخدام اللبن الماعز الفرز المجفف (ب) إلى زيادة المحتوى من الجوامد الكلية ، الكربوهيدرات، الحموضة و الاستيالدهيد و خفض قيم الدهن، البروتين ، الرماد ، الأحماض الدهنية الكلية الطيارة وذلك مقارنة باليوجورت المدعم باللبن البقرى الفرز المجفف (أ). وتبع ذلك أيضا تأثر كمية الطاقة المحسوبة.

٢- زادت قيم الجذب الخثرى لليوجورت زيادة معنوية بالتدعيم عن طريق المعاملة (ب) و ارتبطت أعلي قيم بأقل قيم لمعدلات طرد الشرش من الخثرة في حين أوضحت النتائج ان يوجورت المقارنة (الكونترول) و المصنع من لبن ماعز غير المدعم اتصف بأقل قيم للجذب الخثرى و اعلي قيم لمعدلات طرد الشرش من الخثرة.

٣- أوضحت نتائج التحكيم الحسى أهمية رفع الجوامد الكلية للبن الماعز المعد لصناعة اليوجورت حيث أدى ذلك الى تحسن المظهر العام ، وتماسك و صلابة الخثرة، منع التشريش ولم يكن لنوع اللبن الفرز المجفف تأثيرا معنويا فى هذا المجال فى حين تباينت قيم تحكيم نكهة اليوجورت والذي اتصف بخلوة من النكهات الغربية وغير النظيفة.

قام بتحكيم البحث

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