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(Original Article)

Impact of Adding Whey Protein Concentrate to Goat`s Milk on the Properties of yoghurt

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Abstract

The aim of the study was to fortify goat's milk with WPC in order to manufacture a yogurt with acceptable sensory and chemical properties.Four yoghurt treatments were manufactured to by adding 0.0 as control, 0.5, 1.0, 1.5, and 2.0% WPC respectively. All treatments stored at 5-7 C ° for 14 days and tested when fresh and after 7 and 14 days for chemical, microbiological examination and sensory properties evaluation. The obtained results revealed that, adding WPC to goat's milk caused an increasingin total solid (TS %), total protein (TP %) contents and titratable acidity (TA%). On the other hand it was observed that, adding WPC up to 2% increased the total scores of sensory properties and treatment that made with 2% WPC which was the most acceptable yoghurt. The total scores of sensory properties were almost stable up to the 7 days of storage period. during the first seven days an increase in numbers *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp.*bulgaricus* . All examined yoghurt samples during storage period were not discovered. Yoghurt made from goat milk and WPC gained a higher score for appearance, body & texture, flavor and overall acceptability than control samples.

Keywords: Yoghurt; Whey protein concentrate; WPC; Goat milk; Chemicalcomposition

Introduction

The global production of goat's milk, as well as the suggestion that goat's milk has specific nutritional benefits such as low allergenic potential, high content of short medium chain fatty acids, higher content of oligosaccharides in comparison to ruminant milk, and higher mineral content and bioavailability than cow milk (Zoidou *et al*. 2019).Small ruminant milk, such as goat's milk, is of particular economic interest in developing countries. This type of milk must be produced in a useful strategy for addressing undernutrition issues(Gaddour, and Abdennebi 2013). Indicate that goat's milk yoghurt is a high-quality dairy product. (Zoidou *et al*. 2019) demonstrated that, goat's milk has a weaker texture than milk from cows because lower casein and as1-casein content, lower sedimentation rate of casein micelles, higher casein solubility, higher calcium and phosphorus contents, and lower heat stability Because of its nutritious and health-beneficial properties, yoghurt has been one of the most widely consumed fermented milk products in Egypt since the tribal period. Cow, sheep, and goat

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milk can be used alone or in mixture to make yoghurt. Yoghurt made from goat's milk has poor textural characteristics and a gel structure that is easily susceptible to leakage due to differences in protein composition between goat and cow milk(Gursel *et al*. 2016).Yogurt texture is known to be largely influenced by the protein network produced by casein micelles threads and/or clusters entrapping serum and fat globules.Yoghurt that had been fermented and stirred at a higher temperature had improved textural qualities as a result of a gradual rise in the extent and strength of protein-protein hydrophobic interaction(Herrero and Requena 2006).When manothermosonication was used in the yoghurt making process, the product's textural qualities improved. To improve tension and textural qualities, yoghurt curd has been supplemented with milk. These qualities have also been improved by using processes such the addition of stabilizers like gelatin or pectin, the use of bacterial exopolysaccharides(Herrero and Requena 2006).Due to its digestive properties, nutritional value in the diet of infants, children, and adults, and favourable physiological effects on individuals who suffer from malnutrition and indigestion, Goat milk has a known for as an essential raw material in the dairy industry(Gursel *et al*. 2016). Yogurt's physical, texture, and sensory qualities are essential factors of its quality, which have a direct impact on consumer preference and product acceptability. Among other things, T.P and total sugar (TS) concentrations of milk influence the qualities of yoghurt. In yoghurt manufacturing, increasing TS by adding WPC to milk is a frequent practice (Gursel *et al*. 2016).

Materials and Methods

Materials

Fresh goat's milk was obtained from Arab Al-Amayem village, Assuit, Egypt.Whey protein concentrate 80% waspurchased from Hammer supplement per serving (1) scoop.

Starters

Lactococcusdelbrueckiisspbulgaricus(EMCC 11102) & Streptococcus. thermophilus(EMCC 11044) was obtained from Cairo Microbiological Resource Center (MIRCEN), Faculty of Agriculture, Ain Shams University. Egypt.

Manufacture of yoghurt

Goat`s milk was divided into 5 part, one for control, and the rest was fortified with 0.5, 1.0, 1.5, and 2.0 % whey protein concentrate (C, T1, T2, T3 and T4, respectively). Whey protein concentrate was added to milk and stirred thoroughly, then filtered through cheesecloth. All milk batches were heated to 85C° for 20 min, then cooled to 42C° and inoculated with 1.5% *Streptococcus thermophilus and* 1.5% *Lactobacillus delbrueckii* subsp.*bulgaricus.* The inoculated batches were packed in plastic cups and incubated at 42° C until complete coagulation. All yoghurt treatments were stored in a refrigerator at (6°C±1) for 14 days and were sampled when fresh and at 7 and 14 days for

chemical, microbiological, and sensory evaluation. The experiment was triplicated.

Chemical analysis

Titratable acidity and moisture content, total nitrogen were determined according to A. O. A. C (2012), and Total protein (TP) contents were determined using the following equations: Total protein = TN × 6.38

Fat content was determined by using Gerber method as described by Ling (1963)

Microbiological analysis

Total colony forming unit (cfu) was determined according to Marshall (2004).

Lactobacilli count was estimated on the selective medium for lactobacilli (MRS) as suggested by IDF Standard (1997). The plates were incubated at 37°C for 48 h.

Streptococci count was determined by using M17 agar medium. The plates were incubation at 30°C and observed after 24-48 h (IDF Standard, 1997). Coliform count: Violet Red Bile Agar (VRBA) medium was used for enumeration the coliform group and incubating for 24-48 h at 3 °C (IDF Standard, 1985).Enumeration and counts of yeasts & molds were carried out in the samples using the media of potato dextrose agar as the method recommended by Awad *et al*. (2010).

Sensory evaluation

Yoghurt was judged by ten panelists from the staff members of Dairy Science Department, Faculty of Agriculture, Assuit University. Results were recorded on a score sheet described by Kebary and Hussein(1999).

Statistical analysis

The impact of treatments and storage on the chemical characteristics of Yoghurt Supplemented with Whey Protein Concentrate was studied by the statistical analysis. An ANOVA was done to obtain the mean squares and P-values using the software Statistical Analysis Systems ,SAS version 9,2 for Windows .Differences were tested using the least significant difference (LSD) comparison test when a significant difference ($P < 0.05$) was detected between treatments, time, or their interaction.

Results and Discussion

Present investigation attempts to make yoghurt fortified with different level of WPC 80%0.5, 1.0, 1.5, and 2.0 % (T1, T2.T3 and T4respectively)the obtained final products were evaluated for its chemical, microbiological analysis and sensory evaluation.

Chemical analysis

The results presented in Table (1) indicated that, titratable acidity of all yoghurt treatments increased by increasing the added WPC. It was also observed that, the relationship between the added WPC% and the titratable acidity percentages of yoghurt were both positively correlated. Yoghurt with 2% WPC (T4) gained the highest titratable acidity percentage. These findings may be due to whey protein's stimulating effects on the increasing of LAB cell, which in turn increases the development of lactic acid production as (Gaudreau *et al*., 2013) reported. In all yoghurt treatments titratable acidity steadily rose throughout storage period.

Table 1. Chemical composition of yogurt fortified by WPC during storage at 5±1°C up to 14 days.

Composition	Treatment*	Storage period (days)			Mean
		Fresh	7	14	
Acidity (%)	control	0.89±0.01 *J*	0.98±0.01*G*	1.32±0.01*E*	1.05±0.07 **E**
	T1	0.89±0.01 *J*	0.99±0.01*G*	1.35±0.01*DE*	1.07±0.07 **D**
	T2	0.90±0.00 *IJ*	1.33±0.03 *EF*	1.39±0.02 *C*	1.20±0.08 **C**
	T3	0.92±0.01 *HI*	1.35±0.01 *DE*	1.49±0.02*B*	1.24±0.09 **B**
	T4	0.93±0.01 *H*	1.36±0.01 *D*	1.55±0.01*A*	1.28±0.09 **A**
	Mean	**0.91±0.005 c**	**1.20±0.04 b**	**1.42±0.02 a**	
Fat content (%)	control	3.00±0.00*C*	3.03±0.06*B*	3.00±0.00 *C*	3.03±0.001 **A**
	T1	3.07±0.05*A*	3.00±0.00*C*	3.03±0.06*B*	3.07±0.001 **A**
	T2	3.07±0.06*A*	3.07±0.06*A*	3.03±0.06*B*	3.00±0.001 **A**
	T3	3.03±0.06*B*	3.07±0.06*A*	3.00±0.00*C*	3.03±0.001 **A**
	T4	3.00±0.00*C*	3.03±0.06*B*	3.03±1.25 *D*	3.03±0.001 **A**
	Mean	**3.04**±0.001 **a**	**3.00**±0.001 **a**	**3.06**±0.001 **a**	
Moisture (%)	control	89.11±0.01*A*	88.83±0.01*D*	88.74±0.01*E*	88.88±0.001 **A**
	T1	88.88±0.01*B*	88.86±0.01*C*	88.65±0.01*F*	88.79±0.001 **A**
	T2	88.86±0.01*C*	88.54±0.01*G*	88.22±0.01*H*	88.53±0.001 **A**
	T3	88.2±0.01*I*	87.92±0.07*J*	87.86±0.12*K*	87.95±0.001 **A**
	T4	87.29±0.01*L*	87.06±0.01*M*	80.85±10.4*N*	87.06±0.001 **B**
	Mean	88.46±0.01a	88.22±0.01 b	86.86±0.001 c	
Total solids content (%)	control	10.89±0.01*N*	11.17±0.01*J*	11.26±0.01*I*	11.11±0.001 **E**
	T1	11.12±0.01*M*	11.14±0.01*L*	11.35±0.01*F*	11.20±0.001 **D**
	T2	11.15±0.01*K*	11.46±0.01*G*	11.78±0.01*E*	11.46±0.001 **C**
	T3	11.8±0.01*E*	12.08±0.07*D*	12.14±0.12*C*	12.01±0.001 **B**
	T4	11.71±0.01*G*	12.94±0.01*B*	13.15±0.01*A*	12.60±0.001 **A**
	Mean	**11.34**±0.01 **c**	**11.75**±0.01**b**	**11.93**±0.01**a**	
Total protein (%)	control	3.55±0.01*K*	3.57±0.01*J*	3.54±0.01*K*	3.55±0.001 **E**
	T1	4.01±0.01*I*	4.03±0.00*H*	4.00±0.01*I*	4.01±0.001 **D**
	T2	4.41±0.01*G*	4.43±0.01*F*	4.4.±0.01*G*	4.41±0.001 **C**
	T3	4.88±0.01*E*	4.9±0.01*D*	4.86±0.00*E*	4.87±0.001 **B**
	T4	5.22±0.01*B*	5.29±0.01*A*	5.19±0.01*C*	5.23±0.001 **A**
	Mean	**4.40**±0.001 **b**	**4.44**±0.001 **a**	**4.40**±0.001 **b**	

Means with same litters are not significant at main effects and their interaction according to Duncan multiple range test. STOR: a, b, c, Treat: A, B, C, STOR × Treat: A, B ,C
C*: control .T1, T2, T3 and T4 yoghurt fortified with 0.5, 1.0, 1.5, and 2.0 % WPC, respectively.

Results in Table 1 showed that, in fresh samples the titratable acidity values were 0.89,0.89, 0.90,0.92 and 0.93 % in control, T1.T2.T3 and T4; respectively. The lowest value was in C* and the highest was in T4, which can be explained by the effect of WPC in increasing the rate of lactic acid production from milk lactose during incubation time. These results are in agreement with those obtained by Khairi *et al*., (2020). During 14 days of storage, there was a gradual increase in titratable acidity, reaching to 1.35, 1.39, 1.49 and 1.55 % in T1.T2.T3 and T4; respectively. These results indicate that, addition of WPC to milk before inoculate by the bacterial starter had increase the bacterial ability to form lactic acid from lactose. In the time, the effect of WPC was more in T4. The increase in available nutrients from whey proteins may partially influence the growth of probiotic bacteria, and possibly affected the changes in TS%, acidity, pH values and protein content (Khairi *et al*., 2020).

Results present in the same Table show TS% of in fresh and stored samples. In fresh samples, TS% were 10.89, 11.12, 11.15, 11.8 and 11.71% in control, T1, T2.T3 and T4; respectively. The addition of WPC to milk prior to inoculate had increased the TS% in the product, and the effect of WPC was much higher than that control in all treatments. These results are in agreement with those obtained by Alakali *et al*., (2008), who found that the addition of whey protein concentrate increase TS% comparing with control. During 14 days of storage, there were a gradual increase in TS% in all samples, and reached to 11.35, 11.78, 12.14 and 13.15 % in T1.T2.T3and T4; respectively. The increase in TS% can be due to slight decrease in moisture content as a result of evaporation and the effect of the increase in TA and its effect of synereses of whey from the product. In the same time, the higher content of TS was found in T4 samples comparing with T1.T2 and T3.

Results obtained for TP% in fresh and stored sample are presented in Table 1. T4 and T3 had higher percentage of TP (5.22& 4.88%), which can be explained higher TP% in whey protein concentrate. After 14 days of storage, there was a gradual increase in TP%, it was reached to 4.00, 4.4, 4.86 and 5.19% in T1, T2.T3 and T4; respectively. This can be explained by slight evaporation and decrease in moistures content as a result of the increase in acidity of the product. Similar results were obtained by Salih *et al*., (2020). This is similar to those results obtained by Kermiche *et al*., (2018).By adding more WPC, total solids and total protein levels considerably increased (Tables 1).Obtained results in accordence with those obtained by Wang*et et al.* (2015), Bierzuska and Sokoliska, and Ali *et al*. (2014 and 2018).

Differences in the protein contents of different treatments of yoghurt were detected. Results indicated that increasing the T.S. Adding WPC in yoghurt making resulted in higher protein concentrate. As opposed to that, the protein contents of yoghurt were increased throughout the storage period, these results are in accordence with those published byHerrero and Requena (2006) who reported that, an increase in protein percentage of yoghurt during the storage period.

A significant differences were found in total protein contents (TP %) between all treatments and during storage period ($p < 0.05$). on the other side, no significant difference were founed ($p > 0.05$) in the interaction between treatments and the storage period of yoghurt supplemented with WPC. We found an increase (Table 1) in the TP Due to moisture loss during storage period and thereby, increasing the TS (Effat *et al*., 2001). It was observed that as showen in Table (1), there were no significant changes between all the treatments with regard to the fat percentages. These findingswere in agreements with those published byBlassy and Abdeldaiem in 2018.

Microbiological examination

Data presented in Table (2) represented the microbiological properties of yoghurt fortified with different percentages of whey protein concentrates 0.0, 1.0, 1.5 and finally 2.0% throughout different storage periods fresh, 7 and 14days. it was observed that, in case of fresh samples the total bacterial counts increased from 7.0 to 7.07 by increasing the adding of whey protein concentrates from 0.0 (control) to 2.0% . After 7 days of storage period it was noticed that the total bacterial counts increasedby from 7.01 to 7.10 for control and 2.0% respectively .it was also observed that, after 14 days of storage period the total bacterial counts slightly decreased from 6.91 to 6.74 for control and 2.0% respectively.These results were in agreements with those reported by Kebary *et al*., (2009).With regards to streptococci sp. counts, it was revealed that by increasing the amounts of whey protein concentrate noticeable increase in the counts of streptococci sp. until 7 days of storage period. It was observed that, after 14 days of storage period noticeable decreasing of the streptococci spcounts. The counts of lactobacilli sp. counts take the same trends of increasing in case of fresh samples and after 7 days of storage and decreasing after 14 days of storage period. These results might be due to the increasing of acidity production, which subsequently could retard the bacterial growth throughout the storage. From these data it could noticed that, the counts of streptococci sp. were higher than the counts of lactobacilli sp. These results were in accordance with those published by Hussein *et al*.(2020). In all examined yoghurt samples at all storage periods no mould& yeasts and coliform bacteria had been detected.

Table2 Microbiologicalcontent(log cfu/ g)of yoghurt fortified with WPC during storage at (6±1) for 14 days.

Yoghurt treatments	Storage period(days)														
	0					7					14				
	C*	T1	T2	T3	T4	C*	T1	T2	T3	T4	C*	T1	T2	T3	T4
Total bacteria count	7.00	7.02	7.03	7.04	7.07	7.01	7.04	7.06	7.07	7.10	6.91	6.88	6.83	6.77	6.74
Countsof *streptococci*	7.29	7.30	7.32	7.34	7.35	8.18	8.29	8.17	8.25	8.25	7.96	8.01	7.91	7.96	7.95
Counts of *lactobacilli*	6.47	6.6	6.53	6.50	5.61	6.81	6.87	6.94	6.95	6.92	5.61	5.69	5.75	5.79	5.77

Each value in the table was the mean of three replicates.
C*: Control .T1, T2, T3 and T4 yoghurt fortified with 0.5, 1.0, 1.5, and 2.0 % WPC. ND: Not detected

Both of thecoliform bacteria and Yeasts &Moulds were not detected in all tesed samples. These results are in agreement with those reported by Elsheikh *et al*. (2016) and Ibrahim *et al.*(2018).

Sensory evaluation

Data tabulated in Table (3) represented the sensory scoring of yoghurt fortified with whey protein concentrate throughout different storage periods. From these results it could be noticed that, the gained scores of flavor were 40,41,43,47 and 47 for 0.0, 0.5,1.0, 1.5 and 2.0 respectively. Hence the T4 gained the highest score of flavor. It was observed that, by increseaing the store time the score of flavor were decreased to reach the 40 points out of 45 points for T4 with 2.0% whey protein concentrate after 14 days of storage. On the other hand it was concluded that, the body & texture score were increased with increasing the added amounts of whey protein concentrate. As well as, the increasing of storage period from fresh to 17 days of storage caused decreasing of the gained score of body & texture from 28, 30, 31, 31 and 34 for control, 0.5, 1.0 , 1.5 and 2.0 % whey protein concentrate to 22, 25, 28, 29 and 30 out of 35 points after 14 days storage respectively. With regards to appearance and acidity flavours it was noticed that, both two properties take the same trends, hence it decreased from 9 pints out of 10 points to 5 points for 2.0% whey protein concentrate after 14 days storage. It could be concluded that, The total score of all different treatments at different storage periods out of 100 points were inceased by in increasing the added whey protein concentrate, while, the total score were decreased by increasing the storage time. Finally the fresh T4 (2.0% WPC) gained the highest total score 99 out of 100 points but the T1 after 14 days storage (0.5 % WPC) gained the lowest score 70 points. These results were fit with those reported with Kebary *et al*., (2015) and (Mohran and Tammam 2020)

Table 3 The organoleptic scoring of yoghurt fortified with WPC during storage at (6±1) for 14 days.

treatments	Storage period														
	0					7					14				
	C*	T1	T2	T3	T4	C*	T1	T2	T3	T4	C*	T1	T2	T3	T4
Flavour (45)	40	41	43	47	47	33	38	40	41	43	31	35	37	37	40
Body and texture (35)	28	30	31	31	34	24	28	30	30	31	22	25	28	29	30
Appearance(10)	9	9	9	9	9	8	7	7	7	7	5	5	5	5	5
Acidity (10)	9	9	9	9	9	7	7	7	7	7	5	5	5	5	5
Total score (100)	86	89	92	96	99	72	80	84	85	88	63	70	75	77	80

C*: Control.T1, T2, T3 and T4 yoghurt fortified with 0.5, 1.0, 1.5, and 2.0 % WPC.

Conclusion

Our results showed that, the addition of whey protein concentrate enhances yoghurt textural properties, yielding a product similar to set-type cow's yoghurt. improved the chemical composition and bacteriological quality of the product,

Sensory evaluation such as flavor, body & texture and appearance increased in goat's yoghurt supplemented with WPC as well as, the textural characteristics were increased through- out the product shelf-life.

References

Abdalla, A.K. and Ahmed, Z.F.R. (2019). Physicochemical and sensory properties of yoghurt supplemented with green banana flour. EgyptianJ. Dairy Sci., 47: 1.

Akgul, F.Y. (2018). Enhancement of strained (Torba) yoghurt with Whey Protein Isolates. Int. J. Dairy Technol., 71: 898.

Al-Aswad, S.; Helal, A.; Shamsia, S. M. and Awad, S. (2018). Quality and rheolo-gical properties of sweetened yoghurt and bio-yoghurt enriched with pomegranate juice. Egyptian J. Dairy Sci., 46: 41.

Ali, M.M.E., Kebary, K.M.K. ;Shaheen K.A. and Abo Bakr, B.M. Maally, (2014). Quality of yoghurt made from cow's milk supple-mented with whey proteins. Menoufia J. Agric. Res., 39: 1815.

Bierzuńska, P. and Sokolińska D. (2018). Determination of antioxidant activity of yoghurt enriched with polymerized whey protein. Mljekarstvo, 68: 272.

Blassy, I. Kholoud, and Abdeldaiem A. M. (2018). Preparation and properties of buffalo milk yoghurt fortified with some healthy additives. Egyptian J. Dairy Sci., 46: 51.

Bradley, R.L.J.; Arnold, E.; Barbano, D.M.; Semerad, R.G.; Smith, D.E. and Viries, B.K. (1992).Chemical and physical methods.In Marshall R.T. (Eds) Standard Methods for the Examination.

El-Sheikh, N.A.H.; Rahamtalla, S.A. and Abd-Alla, M.O.M. (2016).Chemical composition of raw milk produced and distributedinKhartoum State, Sudan. Asian Journal of Agriculture and Food Sciences, 03(01): 34-39.

FIL/IDF Standard (94A/1985).Milk and milk products.Detection and enumeration of yeasts and moulds. International Dairy Federation, 41square Vergote, 1040 Brussels, Belgium.

Gaddour, Amor, Sghaier Najari, and Mouldi Abdennebi. 2013. "Physicochemical and Sensory Characteristics of Yoghurt Produced from Goat Milk." *Journal of Animal and Veterinary Advances* 12(24):1700–1703. doi: 10.3923/javaa.2013.1700.1703.

Gursel, A. et al. 2016. "Role of Milk Protein-Based Products in Some Quality Attributes of Goat Milk Yogurt." *Journal of Dairy Science* 99(4): 2694–2703. http://dx.doi.org/10.3168/jds.2015-10393.

Ismail, M.M. (2015). Improvement of nutria-tional and healthy values of yoghurt by fortification with rutubdate.J.Food Sci., 4: 398.

Ibrahim, S.I.O.; Amir, M.A.; Syed, A.A and Marwan, Kh. S. (12018).Comparative studies on the physicochemical and microbiological characteristics of different animal milk collected from the farms of Khartoum State, Sudan. Bioscience Biotechnology Research Communications, 11(3): 387-392.

Ling, E.R. (1963). A textbook of dairy chemistry, 3ed ed. Chapman and Hall, Ltd., Londonof Dairy Products, pp., 433-533.

Marshall, R.T. (2004). American Public Health Association.Standard methods for the

examination of dairy products, 17th Ed Washington, DC., USA.

Mohran, M. A., and A. A. Tammam. 2020. "Chemical, Microbiological, Rheological and Sensory Properties of Yoghurt Fortified with Selenium." *Assiut Journal of Agricultural Sciences* 50(4):51–63. doi: 10.21608/ajas.2020.70972.

Muniandy, P.; Shori, A. B. and Baba, A. S. (2016). Influence of green, white and black tea addition on the antioxidant activity of probiotic yogurt during refrigerated storage. Food Packaging and Shelf Life, 8: 1.25

Saleh, A.E.; Moussa, M.A.M. and Elgaml, N.B. (2019). The use of desert truffle (terfeziaclaveryi) to improve the functional and antioxidant properties of yoghurt. Egyptian J. Dairy Sci., 47: 27.

Zhao, D. and Shah, N. P. (2014). Influence of tea extract supplementation on bifidobacteria during soymilk fermentation. Int. J. Food Microbiol., 188: 36.

Zoidou, Evangelia, Sofia Theodorou, Ekaterini Moschopoulou, Lambros Sakkas, Georgios Theodorou, Artemi Chatzigeorgiou, Ioannis Politis, and Golfo Moatsou. 2019. "Set-Style Yoghurts Made from Goat Milk Bases Fortified with Whey Protein Concentrates." *Journal of Dairy Research* (2018).

تأثير إضافة مركز بروتين شرش اللبن إلى لبن الماعز على خواص الزبادي

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قسم الالبان ، كلية الزراعة ، جامعة أسيوط ، مصر

الملخص

الهدف من الدراسة هو تدعيم حليب الماعز بـــ مركز بروتين شرش من أجـــل تصـــنيع زبادي بخواص حسية وكيميائية مقبولة. تم تصنيع أربعة معاملات زبادي بإضافة 0.0 كعنصر تحكم ، 0.5 ، 1.0 ، 1.5 ، و 2.0٪ مركز بروتين شرش على التوالي. يتم تخـــزين جميـــع العلاجات في درجة حرارة 5–7 درجة مئوية لمدة 14 يومًا واختبارها وهي طازجة وبعد 7 و 14 يومًا للفحص الكيميائي والميكروبيولوجي وتقييم الخصائص الحســـية. أوضـــحت النتـــائج المتحصل عليها أن إضافة مركز بروتين شرش إلى حليب الماعز تسبب في زيـــادة محتـــوى المواد الصلبة الكلية والبروتين الكلي والحموضة القابلة للمعايرة من ناحية أخرى ، لـــوحظ أن إضافة مركز بروتين شرش حتى 2٪ زاد من إجمالي درجات الخصائص الحســـية والمعاملـــة التي تم إجراؤها باستخدام 2٪ مركز بروتين شرش وهو الزبادي الأكثر قبولًا. كانت النتـــائج الإجمالية للخصائص الحسية مستقرة تقريبًا حتى فترة التخزين لمدة 7 أيام. خلال الأيام الســـبعة الأولى زيادة في أعداد Streptococcus thermophilus و Lactobacillus delbrueckii subsp.bulgaricus. لم يتم اكتشاف جميع عينات الزبادي التي تم فحصها خلال فترة التخزين. حصل الزبادي المصنوع من حليب الماعز و مركز بروتين شرش على درجة أعلى من حيث المظهر والجسم والقوام والنكهة والقبول العام مقارنة بعينات التحكم.

الكلمـات المفتاحيـة : *زبـادي ؛ مركـز بروتينـات شـرش اللـبن .حليـب المـاعز التركيـب الكيميـائي التحليـل الميكروبيولوجي ؛الجودة الحسية.*