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Research Paper

Assessment of Physico-chemical Characters of Yoghurt from Camel and Cow's Milk in Different Ratio at OOG Dairy Industry in Banadir Region-Somalia

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ABSTRACT
Camels are the most important livestock animal in arid and semi-arid areas of Africa and Asia used for milk, meat and hides supply, as well as for transport and for field cropping. Camel milk is consumed predominantly fresh or after it turns sour. Camel milk does not coagulate easily and as a result it is difficult to make fermented dairy products such as cheese, yoghurt and butter from camel milk. The aims of this study were to observe the influence of combination of yoghurt made from camel and cow milk to physicochemical properties and sensory evaluation of yoghurt product. For this study five treatments of different ratios of camel and cow milk where used (T1:100% camel milk, T2: 75% camel milk and 25% cow milk, T3: 50% camel milk and 50% cow milk, T4: 25% camel milk and 75% cow milk and T5: 100% cow milk), physicochemical properties such total soluble solids, pH level and acidity of all treatments where measured, Syneresis (%) was measured by centrifugation at 1100 rpm for 10 minutes. Sensory characterization was performed with panelists, who evaluated the following sensory attributes: appearance, color, flavor, texture and overall acceptance. All samples showed non-significant in the physico-chemical properties. The syneresis of yogurt treatments ranged from 35.0 to 61.0%. Treatments containing high amount of cow milk (100% and 75% cow milk) showed the lowest syneresis values compared to treatments produced with large amount of camel milk (100%, 75% and 50% camel milk). According to sensory evaluation for appearance, color and flavor were not significantly difference for all treatments but for texture and overall acceptance the panelists were significantly preferred treatments with high amount of cow milk, and these can be solved the use of more stabilizers in yoghurts made from camel milk.

KEYWORDS: *Yoghurt, Homogenization, Standardization, inoculation and incubation.*

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I. INTRODUCTION

Camels are the most important livestock animal in arid and semi-arid areas of Africa and Asia used for milk, meat and hides supply, as well as for transport and for field cropping. They are well adapted to harsh conditions and capable of producing more milk for longer period compared to other domestic dairy animals (Al-Owaimer et al., 2014). The average length of lactation in the camel is 12–18 months, and the amount of milk produced per day varies from 3.5L under harsh condition to 40L under intensive management (Hashim et al., 2009).Although camels are producing only 0.3% of total world milk production, in some countries such as Somali, Djibouti, Qatar and United Arab Emirates, camels are producing approximately43.38, 41.21, 22.96 and 21.25% of their total milk production respectively (FAO, 2013).

Camel milk plays an important role in the nutrition of camel herders in the arid and semi-arid regions. The nutritional value of camel milk is basically related to its chemical composition (Mohamed, 1990).Feed and water availability can affect the chemical composition and taste of camel milk, which contains 2.9 to 5.5 % fat, 2.5 to 4.5% protein, 2.9 to 5.8% lactose, 0.35 to 0.90% ash, 86.3 to 88.5% water, and 8.9 to 14.3% Solid None Fat (SNF) (A, 2001). The mean composition of protein and nitrogen fraction of camel milk is generally similar to those of cow's milk; the average values for the casein and whey protein content varies from 1.9 to 2.3 percent and 0.7 to 1.0%, respectively. The fat content of camel milk varies greatly from 1.10-5.50% depending on the breed and feeding condition (Farah, 1991)with relation to cattle, camel milk is richin vitamin C (Kheraskov, 1961).

Yoghurt is a product of the lactic acid fermentation of milk by addition of a starter culture. It provides milk proteins with a higher biological value and provides almost all the essential amino acids necessary to maintain good health (Weerathilake, 2014)) and it can provide the body with significant amounts of calcium in a bioavailable form.

II. RESEARCH METHODOLOGY

General objective

The general objective of this study is to evaluate Physico-chemical characteristics of yogurt from camel`s milk and cow`smilk indifferent rations.

Specific objectives

- To describe the manufacturing of yogurt from camel milk and cow milk at different rations.
- To determine the physicochemical properties like PH, acidity and total soluble solids of the yogurt produced.
- To evaluate the sensory analysis of the yogurt, produce,

Significance/importance/justification

Due to the claims that camel milk is better than cow's milk, getting other camel milk products such as yoghurt benefits the market of camel milk which is more available in Somalia, thus the study will focus to improve camel by producing yoghurt combined with cow milk.

Scope of the study

This is study focused only on the production of yoghurt from different ratios from camel and cow milk and their combinations and analyzing some physicochemical parameters available in lab. The study also conducted sensory evaluation of the processed yoghurt.

Research design

Complete randomized design single factor is used in this study. This study was focus on Assessment Physico-chemical character of yogurt from camel's milk and cow's milk in different ratio OOG dairy industry in Benadir region-Somalia. In this study, the researchers used experimental research design to know the role Physico-chemical character of yogurt from camel's milk and cow's milk in different ratio.

For this study five treatments of different ratios of camel and cow milk where used (T1:100% camel milk, T2: 75% camel milk and 25% cow milk, T3: 50% camel milk and 50% cow milk, T4: 25% camel milk and 75% cow milk and T5: 100% cow milk).

The five treatments were added ingredients such us Skimmed milk powder: 15%, Stabilizer pectin: 0.08%, Starch: 0.5% and culture bacteria.

Study area: This study is executed in OOG industry located at SIINKA DHEER near Banadir region, Somalia.

III. MATERIALS AND METHODSRaw Milk

Fresh cow and camel milk which is the main ingredient for manufacturing yoghurt was obtained from OOG Livestock Farm , Afgoi, Somalia, at early in the morning and transported to the laboratory of OOG dairy factory for processing andanalysis.

Skimmed milk powder

Skimmed milk powder which is spray dried milk and used generally to increase the total solids in raw milk to achieve the desired yoghurt mix was obtained from the local market.

Bacterial Starter Culture
Yoghurt starter culture YOLK FLEX (YF-L811) which contains lactic acid-producing bacteria, Lactobacillus bulgaricus and Streptococcus thermophiles manufactured by Chr. Hansen, Denmark was bought from Promaco ltd. Kenya which is an authorized supplier of Chr. Hansen in east Africa.

Low-Methoxy Pectin
Low-Methoxy (LM) pectin is the preferred type for (refrigerated) cup yogurt. Very small amounts modify the Stabilizer pectin :(0.08%= 1.6gr).

Modified Starch
Starch is used in yogurt to increase its viscosity, improve its mouth feel, and prevent syneresis. Modified Starch E1442 was bought from Promaco ltd. Kenya.

The equipment's and devices to produce and analyze after the production will include:
Mixer or blender, Batch pasteurizer, Temperature sensor, Water bath for cooling, Incubator, Refrigerator andThermometer

Milk samples
Fresh camel milk was obtained from local dairy camel farms and fresh cow milk was obtained from animal production department dairy farm, Fresh milk Samples were taken by clean plastic containers to OOG dairy industry for determination of physico-chemical component. Skimmed powder milk was obtained from local market.

Methods Yogurt
Five samples of yogurt were be prepared at different ratios of pectin and modified starch and with the addition ofstabilizers as shown in table below:

% of cow/camel milk / **Yoghurt Samples**	Camel Milk	Cow milk
Sample 1 (Control)	0%	100%
Sample 2	25%	75%
Sample 3	50%	50%
Sample 4	75%	25%
Sample 5	100%	0%

Table 3.5.1: Ratios of addition of the cow and camel milk to the prepared yoghurt samples.

IV. RESULTS AND DISCUSSION

Physico-chemical analysis of yoghurt processed from camel milk
Physico-chemical properties of yoghurt produced from camel milk was on pH, acidity and Total soluble solids (Table 4.1).The pH was observed (4.01±0.02) followed by Total soluble solids (TSS) Brix (14.05±0.5) and Total Acidity Value (0.60±0.02).

Table 4.1 some Physico-chemical properties of yoghurt produced from camel milk

Physico-chemical analysis	Produced yoghurt MEAN+SD*
Total soluble solids (TSS)Brix	14.05±0.5
pH	4.01±0.02
Total Acidity Value	0.60±0.02

*Values are means of triplicate determinations

Synersis

As shown in Table 4.2 below, syneresis of yogurt samples after centrifugation ranged from 35.0% to 65.0%. A sample containing less camel milk shows the lowest syneresis values compared to treatments with 100%, 75% and 50% of camel milk. Yoghurt made from 100% and 75% cow milk significantly ($p<0.05$) has less syneresis.

Table (4.2) Mean syneresis values

Sample	Syneresis %
T1: Camel [100%]	65.0a
T2: Camel [75%] Cow [25%]	50.0
T3: Camel [50%] Cow [50%]	50.0a
T4: Camel [25%] Cow [50%]	35.0b
T5: Cow [100%]	35.0b

*Means within a column with different superscript are significantly different ($p<0.05$).

Sensory evaluation of yoghurt produced from camel milk

The sensory evaluation of pure and mixed camel and cow milk yoghurt treatments wereon color, appearance, flavor, texture, and overall acceptability, but had no significant (P< 0.5% level) recorded on the color in table (4.3).

The best value for taste, flavor, smell, texture and overall acceptability were obtained byyoghurt made from pure cow milk followed by the (Treatment 1 camel milk 100%), then (Treatment 2 Camel milk 75% and cow milk 25%), then (Treatment 3 Camel milk 50% and cow milk 50%), then (Treatment 4 Camel milk 25% and cow milk 75%) and the last one (Treatment 5 of cow milk 100%).

Table 4.3: mean values of sensory evaluation

Sample	*Treatment 1*Camel milk(100%)	*Treatment 2* Camel milk (75%)and cow milk (25%)	*Treatment 3* Camel milk (50%)and Cow Milk (50%)	*Treatment 4* Camel milk (25%)and Cow milk (75%)	*Treatment 5*Cow milk (100%)
Appearance	2.5a	2.7a	2.0a	2.7a	2.5a
Color	2.3a	2.1a	2.1a	2.1a	1.9a
Texture	4.5a	3.7ab	2.6ab	2.0a	1.8a
Flavor	3.00a	3.00a	2.10a	2.40a	2.70a
Overall Acceptance	2.3b	2.6ab	2.2b	2.8ab	4.1a

*****(a, b) Values with same index are not significantly different at P < 0.5% level.

V. DISCUSSIONS

The Physico-chemical properties of yoghurt produced from camel milk was on pH, acidity and Total soluble solids (Table 4.1).The pH was observed (4.01±0.02) followed by Total soluble solids (TSS) Brix (14.05±0.5) and Total Acidity Value (0.60±0.02).

The average titratable acidity of camel milk yoghurt observed in the present study was higher than the value (0.78%) reported by Bhagiel, Mustafa, Tabidi, and Ahmed (2015) for camel milk (Al-Zoreky, (2015))reported a pH value of 4.59-4.63 and a titratable acidity of 0.71-0.87% lactic acid for camel milk yoghurt produced in Saudi Arabia.On the other hand, (Hashim, 2009). The average total solids (TS) content of camel milk yoghurt observed in the present study was higher than that reported by (Bhagiel, (2015) and Bashir, (2009)).

Syneresis of yogurt samples after centrifugation ranged from 35.0% to 65.0%. A sample containing less camel milk shows the lowest syneresis values compared to treatments with 100%, 75% and 50% camel milk. Yoghurt made from 100% and 75% cow milk significantly ($p<0.05$) has less syneresis. (Al-Zoreky and Al- Otaibi, 2015) Reported camel milk still fails to produce a gel-like structure for yogurt even by addition of different types of stabilizers and that camel milk is poorer in κ- casein and lacks β-lacto globulin proteins which are rich in cow milk.

VI. CONCLUSION AND RECOMMENDATIONConclusion

The present study showed that the yoghurt treatments made from camel milk and combinations of camel and cow milk were not preferred well by the panelists due to the limited awareness of yoghurt to Somali community. But the holding of water or syneris is good at yoghurt made 100% and 75% cow's milk, where treatments with only camel milk were showed the highest syneris.

VII. Recommendations

- This study noted that the panelists were not preferred well the whole yoghurt because of limited aware toyoghurt and most of other dairy products specially fermented milk products, thus
- We recommend to do study on the awareness of dairy products such as yoghurt, cheese, butter etc. In Somalicommunity.
- We also recommend more research studies on utilization of camel and cow milk products
- It is recommended that yoghurt be made from camel milk ratios, but the optimal levels are 100% and 75% cow'smilk of the overall milk.
- More research is needed to rule out the possibility of camel milk yoghurt being mixed with milk from otheranimals.
- Supporting the manufacture of camel milk dairy products.

REFERENCES

[1]. R. O. ((2013)). Evaluation of Mango Fruit yoghurt Produced from camel milk supplemented with gum Arabic.
[2]. A, K. B. (2001). Pakistan Journal of Agricultural Sciences,.
[3]. Abdelgadir, W. S. (The traditional fermented milk products of the Sudan.). (1998).
[4]. Abu-Taraboush, H. M. ((1996).). Comparison of associative growth and proteolytic activity of yoghurt starters in whole milk from camels and cows.
[5]. Afaf Kamal-Eldin, Ahlam Alhammadi, Adem Gharsallaoui, Fathalla Hamed, Sami Ghnimic,. (2020). Physicochemical, rheological, and micro-structural properties of yogurts produced from mixtures of camel and bovine milks.
[6]. NFS journal, Volume 19, June 2020, Pages 26-33.
[7]. Agrawal, R. P. ((2007a)). Zero prevalence of diabetes in camel milk consuming Raica community of northwest Rajasthan, India.
[8]. Ahmed, M. M. ((2013).). Effect of Fortifying Camel's Milk with Skim Milk Powder on the Physicochemical, Microbiological and Sensory Characteristics of Set Yoghurt Advance Journal of Food Science and Technology5(6).
[9]. Al-Attas, A. S. ((2008)). Determination of essential elements in milk and urine of camel and in Nigella sativaseeds.
[10]. Al-Owaimer, A. N., Suliman, G. M., Sami, A. S., Picard, B., & Hocquette, J. F. . (2014). Chemical composition and structural characteristics of Arabian camel (Camelus dromedarius) milk. longissimus thoracis. . Meat Science,96, 1233–1241.
[11]. Al-Saleh, A. A. ((2011).). Physicochemical properties of probiotic frozen yoghurt made from camel milk.
[12]. AOAC. ((2002).). Arab Organization for Agricultural Development.
[13]. Asresie A, E. S. ((2013)). Churning efficiency and microbial quality of butter made from camel milk alone andblending it with goat milk.
[14]. Attia, H. ((2001).). Dromedary milk lactic acid fermentation microbiological and rheological characteristics.
[15]. Barłowska, J. S. ((2011)). Nutritional value and technological suitability of milk from various animal species used for dairy Production. 10: .
[16]. Bashir, A. ((2009)). Effects of gumarabicon enzymatic coagulation of camel milk (Doc-toral dissertation,Sudan University of Sci-ence & Technology).
[17]. Bhagiel, I. A. ((2015)). Comparison between the physiochemical attributes of yogurt processed from camel milk and that processed from cow milk and thee storage.
[18]. Barłowska, J. S. ((2011)). Nutritional value and technological suitability of milk from various animal species used for dairy Production. 10:.
[19]. Bashir, A. ((2009)). Effects of gumarabicon enzymatic coagulation of camel milk (Doc-toral dissertation,Sudan University of Sci-ence & Technology).
[20]. Bhagiel, I. A. ((2015)). Comparison between the physiochemical attributes of yogurt processed from camel milk and that processed from cow milk and thee storage.
[21]. Bilal MQ, A. A. ((2004)). Dairy Hygiene and Disease Prevention. Deeth, C. H. ((1981).). Yoghurt: Nutritive and Therapeutic Aspects.
[22]. Elagab, M. a. ((2002).). The dairy product and Globaliztion challenges-troubles and solutions.
[23]. El-Agamy, E. ((1994).). Camel colostrums: antimicrobial factors comm. Coll Dromedaries et Chameaux: animauxlaitiers.
[24]. El-Agamy, E. I. ((2009)). Are camel milk proteins convenient to the nutrition of cow milk allergic children.
[25]. El-Agamy, E. R. (1992.). Antibacterial and antiviral activity of camel milk protective proteins. .
[26]. Eyassu Seifu, .. ((2007)). Handiling, preservation and Utilization of camel milk in Jigjiga and Shinile Zones ofSomali Regional State19(4).
[27]. F, H. ((1999)). Milk Quality. Chapman and Hall Food Science Book Aspen Publishers, Inc.
[28]. FAO. ((2010)). Food and Agriculture Organization of the United Nations (FAO). FAO. (2013). Milk and dairy products in

human nutrition. Rome.
[29]. FAO. ((2008).). Camel milk. Retrieved from. http://www.fao.org/ag/againfo/themes/en/dairy/camel.
[30]. Farah, Z. &.-R. ((1985)). Separation and characterization of major components of camel milk casein.
[31]. Farah, Z., & Streiff, T. a. ((1990).). Preparation and consumer acceptability tests of fermented camel milk inKenya short communication.
[32]. Gran, S. M. (1991.). A comparative study on ferment ability of camel and cow milk by lactic acid culture.
[33]. Hashim, I.B., Khalil, A.H., & Habib, H. (2009). Quality and acceptability of a set- type yogurt made from camelmilk. Journal of Dairy Science, 92(3), 857– 862.
[34]. Hassan, R. A. ((2007).). effect of pasteurizationofrawmilkandstoragetemperatureonthechemicalcompositionof fermented camel milk.
[35]. Hassan. A, a. A. ((2010).). Nutritional Evaluation of yoghurt prepared by different starter cultures and theirphysiochemical analysis during storage .
[36]. Hossain MB, D. S. ((2013)). Physiochemical Characteristics of Various Raw Milk Samples in a Selected Dairy Plant of Bangladesh.
[37]. Ibrahem, S. E. ((2016).). Processing, composition and sensorychar-acteristic of yoghurt made from camel milkand camel-sheep milk mixtures.
[38]. Ibrahim, A. (.(2015)). Effects of various stabilizers on physiochemical properties of camel's milk yoghurt.
[39]. Imran M, K. H. ((2008)). Physicochemical characteristics of various milk samples available in Pakistan.
[40]. J, H. ((2004)). Mediterranean milk and milk products: Review. Kamao M, T. N. ((2007)). Journal of HealthScience 53:.
[41]. Kavas, N. ((2016)). Yoghurt production from camel (camelus dramedarius) milk forthwith samphiremolasses anddiloids.
[42]. Kheraskov, S. (1961). Composition, properties and nutritive value of camel milk.
[43]. Kholif AM, A. E.-N.-A.-A. ((1994)). Effect of spraying diazinon to control the external parasites on theproductive performance of dairy animals.
[44]. Kosikowski, F. ((1982).). Cheese and fermented food, 2nd edition.
[45]. Lee and Lucey. ((2010).). Formation and physical properties of yoghurt.
[46]. Magjeed, N. A. ((2005).). Corrective effect of milk camel on some cancer biomarkers in blood of rats intoxicatedwith aflatoxin B1.
[47]. Mansour AIA, E.-L. M. ((2012)). A Preliminary Detection of Physical and Chemical Properties, Inhibitory Substances and Preservatives in Raw Milk.
[48]. Mohamed, M. a.-R. (1990;). Hard cheese from camel milk.
[49]. Muir D.D, B. J. ((2000).). Milk and milk products .Pp. 197-219 in the stability and shelf life of food.
[50]. Mukasa-Mugerwa, E. ((1981).). The camel (Camelus dromedarius): A bibliographical review. Addis AbabaEthiopia.
[51]. Quan, S. T. ((2008)). Angiotensin I-converting enzyme inhibitory peptides in skim milk fermented withLactobacillus helveticus 130B4 from camel milk in Inner Mongolia, China.
[52]. Sarwar M, K. M.-U.-N. ((2002)). Dairy industry in Pakistan:.
[53]. Schuhmacher M, B. A. ((1991)). Dietary intake of lead and cadmium from foods in Tarragona Province, Spain.
[54]. Seifu.No table of figures entries found., E. ((2007)). Handiling, preservation and Utilization of camel milk in Jigjiga and Shinile Zones of Somali Regional State19(4).
[55]. Shalash, M. (1979). Utilization of camel meat and milk in human nourishment. In: IFS.
[56]. Simth, S. J. ((2004)). FOOD Processing principles and applications 1st Edition.
[57]. Suleiman, S. ((1982)). Chemical and microbiological studies on sundaes yoghurt (zabadi) Sample collected fromKhartoum area.
[58]. Tamime, A. a. ((1999).). Yoghurt science and technology 2nd edition.CRC.
[59]. Weerathilake, W. R. (2014).). The evolution, processing, varieties and health benefits of yoghurt.
[60]. Wernery, V. ((2007).). Camel milk new observations. Camel Conf-Book. International-Camel Conference.