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Studies on physicochemical parameters of yoghurt incorporated with goat milk and cow milk

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Abstract
A study was conducted to develop yoghurt incorporation of different of goat milk and cow milk quality was evaluated on parameters such as protein, fat, ash, moisture, lactose, total solid and acidity. There were four treatment and each were replicated five times control (T0) was prepared by adding 100% goat milk. T1 was prepared by adding 60% goat milk,T2 was prepared by adding 70% goat milk and 30% cow milk and T3 was prepared by adding 80% goat milk and 20%cow milk. T3 was found to be the best chemical parameter average score of (3.40)for protein,(4.82) for fat,(4.54) for lactose (85.72) for moisture (0.71)for ash (14.28) for total solids (0.76)for acidity.

Keywords: yoghurt, goat milk, cow milk, quality

Introduction
Goats were among the first farm animals to be domesticated. As indicated by the archaeological evidence, they have been associated with man in a symbiotic relationship for up to 10,000 years. Goats are important component of livestock industry having adaptability to harsh climates which make them suitable for landless and marginal farmers. Accurate statistics are required to determine the future outlook of the goat populations and their productivity. The zoological nomenclature of goat is Carpushircus. Goats are present in all the continents and the world total numbers of goats were 861.9 million. The largest number of goats is observed in Asia, followed by Africa, in Asia 514.4 million, Africa 291.1 million. Goat is truly known as the poor man's cow.

Caprine milk is wanted or even needed by people of all income and age groups. One of the prominent aspects of demand of goat milk is its home consumption. This demand is increasing because of the growing populations of people as well as due to increasing levels of per capita income and the connoisseur interest in goat milk products especially in cheeses and yoghurts in many developed and developing countries. In addition to that, another important aspect of demand for goat milk derives from the affliction of persons with cow milk allergies and other gastro-intestinal ailments. Despite the much larger volume available of cow milk, it's much cheaper production and lower market price, the production and marketing of goat milk and its products is therefore, an essential niche in the total dairy industry sector.

In general, goat milk is a source of high quality protein, fat, vitamins and minerals. Compared to cow milk, the goat milk contains about 13% more calcium, 25%-vitamin B6, 47%- Vitamin A: it is 1.5 times richer in potassium, 3 times niacin, 4 times-copper and third-selenium. It has no carotene, it has been redesigned the body into vitamin A, it is much more vitamin B12-hematopoietic factor controlling all metabolic processes in the body. Goat milk has a good antirahiticheskim property due to the high content of calcium, phosphorus, cobalt, copper, selenium, magnesium, iron, manganese, sialic acid, which is part of the body's immunological barriers (Pelevina *et al.*, 2010.)

Fermented milks have been developed throughout the world as a means of preserving milk against spoilage. The important fermented milks in India are dahi, shrikhand, lassi, butter milk etc. These traditional foods have persisted over the centuries in the developing world. But the scale of production ranged from house hold production to large scale production, wherein use of selected starter cultures, automatic processes and modern equipments are involved. Fermented milks are popular in view of organoleptic and other properties such as the characteristic flavour, refreshing taste and improved digestibility.

Fermented goat milk products are traditionally produced in the Mediterranean peninsula, Middle East, southern Russia and in the Indian subcontinent. Lactic acid bacteria are often used as probiotic starter culture and health effects from these have been reported repeatedly. The viable lactic acid bacteria along with some of probiotics in fermented milk products have been associated with reduced lactose intolerance, a well-balanced intestinal microflora, anti- microbial activity, stimulation of the immune system and anti- tumor, hypo-cholesteremic and anti- oxidative properties in humans. One of the disadvantages with goat milk is the almost non-existent content of Folic acid. In a fermented product the above problem could be solved by using folate producing bacteria during fermentation.

Yoghurt, fermented milk, is believed to possess special nutritional attributes even though complete supporting scientific evidence has been lacking. Its consumption seemed to be associated with population having greater longevity. Yoghurt cultures produce certain metabolites during their growth in the product. That allows the milk proteins to be digested and absorbed more rapidly than the native protein. Certain of these metabolites also have definite antagonistic effect against food borne pathogens.

Yogurt made from cow milk is widely consumed in the world. On the other hand, there is a desire for alternatives to cow milk due to problems relating to gastrointestinal intolerance and market demand for the formulation of novel dairy products. Goat milk is reported to have higher digestibility and lower allergenic properties compared to cow milk (Senaka Ranadheera *et al.*, 2012). It also has a higher content of short chain fatty acids in milk fat, higher content of zinc, iron, and magnesium, and antibacterial characteristics (Slacanac *et al.*, 2010). In addition, these benefits may be further enhanced by using goat milk as a vehicle for delivering probiotics and prebiotics.

Use of goat milk for preparation of various dairy products is an age old practice throughout the world. In fact, some of the products are exclusively prepared from goat milk, for instance cheeses in Europe and Kefir in Russia.

Table 1: Average composition (%) of Milks by Webb and Johnson (1965).

Species	moisture	fat	protein	Lactose	Ash	Solid not fat	Total solids
Goat milk	87.00	4.25	3.52	4.27	0.86	8.75	13.00
Cow milk	87.20	3.70	3.50	4.90	0.70	9.10	12.80
Human milk	87.43	3.75	1.63	6.98	0.21	8.82	12.75

Materials and Methods

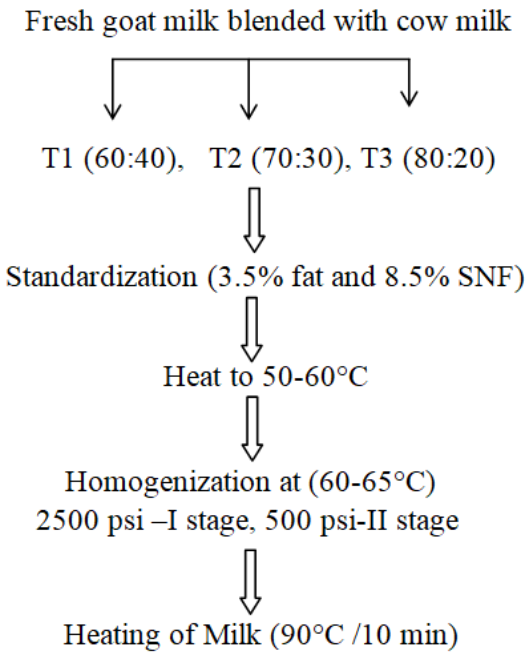
The experimental work was carried out in the research laboratory of department of Dairy, Technology, Warner college of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences Allahabad. Cow and Goat Milk - it was collected from local village of Allahabad.

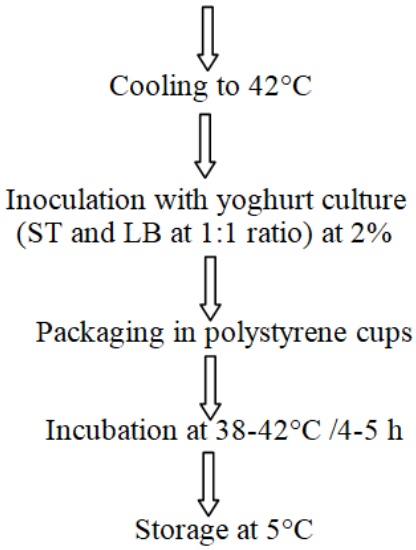
Yoghurt Culture: - Traditional mixed yoghurt culture i.e. *Streptococcus salivarius sp. thermophilus*and *Lactobacillus delbrueckii ssp. bulgaricus* NCDC263 were obtained from National Collection Of Dairy Culture, Dairy Microbiology Division at NDRI (National Dairy Research Institute Karnal, Haryana, India). yoghurt was prepared by the different level of cow and goat milk. Numbers of treatment were 4 which were replicated 5times.

Procedure adopted for manufacturing Blended of A Goat and Cow milk Yoghurt

For control and experimental yoghurt was prepared by using different ratios Blending of Goat and Cow milk was optimized as (60:40, 70:30, 80:20). The milk was pasteurized, cooled to 42°C and yoghurt culture was added at 2.0%. Then mix was then incubated at 42°C till we achieve an acidity of 0.08 %. Then Filling into cups and Incubation (38-42°C/7hrs) again Cooling (5-8°C) and Storage (4-6 °C).

Flow Diagram for preparation of experimental yoghurt by blending goat milk and cow milk





Treatments Combinations

T_0 - Yoghurt prepared from Goat milk. (100:0)

T1- yoghurt prepared by blending of goat and cow milk (60:40)

T2- yoghurt prepared by blending of goat and cow milk (70:30)

T_3 -yoghurt prepared by blending of goat and cow milk (80:20)

Results and Discussion

Table 2: Average of data obtained on physico-chemical analysis in five replication in control and experimental Yoghurt:

Parameters	Treatments (Mean) value				
	T_0 T_1		T_2	T_3	C.D. Value
Moisture	86.96	85.95	85.87	85.72	0.225
Totals solids	13.03	14.05	14.13	14.28	0.102
Fat	3.5	4.71	4.76	4.82	0.103
Protein	3.56	3.24	3.29	3.40	0.122
Lactose	4.44	4.70	4.61	4.54	0.035
Acidity	0.74	0.71	0.73	0.76	0.035

Table 1 Average moisture percent of control and experimental Blend of Goat and cow milk Yoghurt.

The scores of T_0 (100% goat milk) ranged from 87.70-86.03, T_1 (60% goat + 40% cow milk) ranged from 86.74-85.60, T_2 (70% goat + 30% cow milk) ranged from 86.30-85.26 and T_3 (80% goat + 20% cow milk) ranged from 86.46-85.22 respectively was 86.96 in T_0 followed by T_1 85.95, T2 85.87 and lowest average score was obtained in T_3 (85.72).

The results showed that treatment T_1 was best in moisture percent because T_1 having suitable combination 60% goat and 40% Cow milk.

The difference in score for moisture of yogurt was Significant

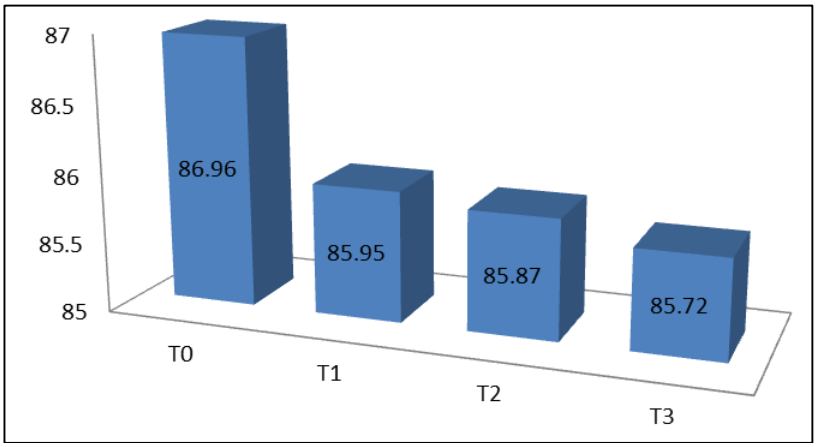


Fig 1: Average Total solids percent of control and experimental Blend of Goat and Cow Milk Yoghurt.

The highest average score Total solids percent was 14.28 in T_3 followed by T_2 14.13, T_1 14.05 and lowest average score was obtained in T_3 (13.03).

The results showed that treatment T_1 was best in Total Solids percent because T_1 having suitable combination 60%Goat milk and 40% Cow milk.

The difference in score for Total solids of yogurt was Significant

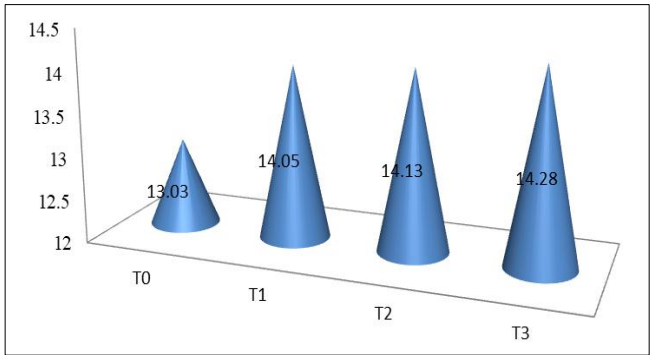


Fig 2: Average Fat Percentage of control and experimental Blend of a Goat and Cow milk Yoghurt.

The scores of T_0 (100% goat milk) ranged from 3.5-3.5, T_1 (60% goat + 40% cow milk) ranged from 4.89-4.60, T_2 (70% goat + 30% cow milk) ranged from 4.81 -4.60 and T_3 (80% goat + 20% cow milk) ranged from 4.99-4.70 respectivel.
The highest average score fat percent was 4.82 in T_3 followed by T_2 4.76, T_1 4.71 and lowest average score was obtained in T_0 (3.5).
The results showed that treatment T_1 was best in Fat percent because T_1 having suitable combination 60% goat milk and 40% Cow Milk.
The difference in score for Fat of yogurt was Significant.

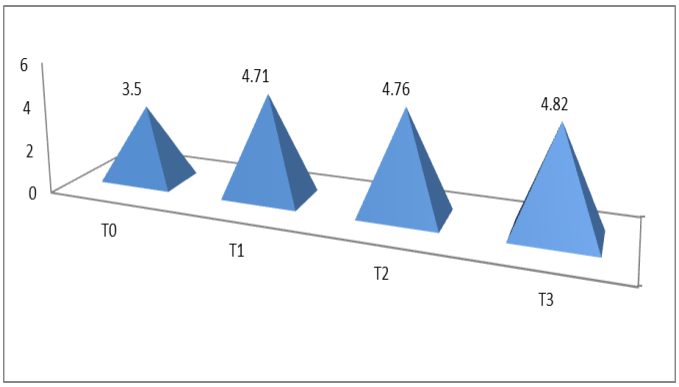


Fig 3: Average Protein percent of control and experimental Blend of Goat and Cow milk Yoghurt.

The highest average score Protein percent was 3.56 in T_0 followed by T_3 3.42, T_2 3.29 and lowest average score was obtained in T_1 (3.24).
The results showed that treatment T_1 was best in Protein percent because T_1 having suitable combination of 60% Goat milk and 40 % Cow milk.
The difference in score for Protein of yogurt was Significant.

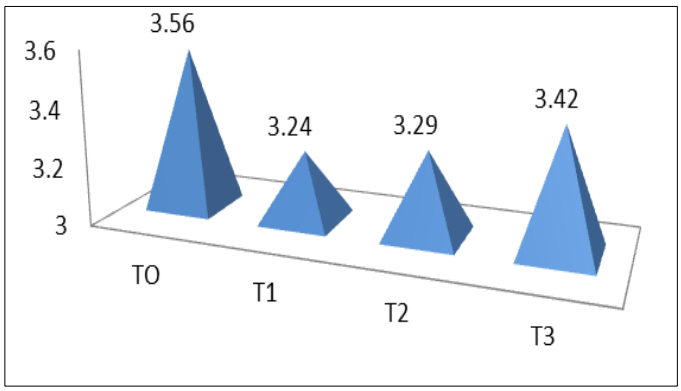


Fig 4: Average percent of Acidity control and experimental Blend of Goat and Cow Milk Yoghurt.

The highest average score Acidity percent was 0.76 in T_3 followed by T_0 0.74, T_2 0.73 and lowest average score was obtained in T_1 (0.71).
The results showed that treatment T_1 was best in Acidity percent because T_1 having suitable combination 60% goat milk and 40% Cow Milk.
The difference in score for Acidity of yogurt was non-Significant.

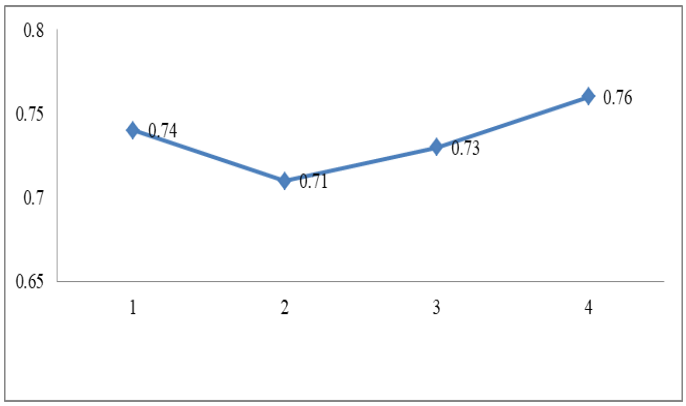


Fig 5: Average percent of Acidity control and experimental Blend of Goat and Cow Milk Yoghurt

Conclusion

Studies on Blend of a Goat and Cow Milk with respect to its composition, physico–chemical, nutritional and technological attributes under Indian context are very scarce and limited. The use of caprine and bovine milk in cheese making is well known, but the production of fermented blend of caprine milk with cow milk via probiotics has not yet been developed. During fermentation caprine milk loses its characteristic goaty taste, which is unacceptable to many consumers. Moreover, the nutritive value of caprine milk increases during fermentation.its very much important in promoting caprine milk and its dairy products which are very much nutritionally superior to bovine milk and its products. Keeping this in view, a study is carring out to elicit the information on quality parameters of yoghurt prepared from a blend of Goat and Cow Milk to utilize milk in the preparation of fermented milks like yoghurt with reference to Goat milk.
On the basis of the results obtained during the study it was concluded that Blending of Goat and Cow milk can be used for the preparation of yoghurt. The data obtained on various parameters were statistically analyzed. Organoleptic evaluation showed that yoghurt prepared by using 60% Goat and 40%Cow milk were used (treatment T_1) was found to be more acceptable in terms of sensory quality.

References

1. Amatayakul T, Zisu B, Sherkat F, Shah NP. Physical characteristics of set yoghurts as affected by co-culturing with non-EPS and EPS starter cultures and supplementation with WPC. Aust. J Dairy Technol. 2005; 60(3):238-243.
2. Asperger H. Applicability of analytic methods for assessment of yoghurt quality. Dairy Sci. Abstr. 1977; 3:594.
3. Barrionuevo M, Alferez MJM, Lopez Aliaga I, Sanz Sampelayo MR, Campos MS. Beneficial effect of goat milk on nutritive utilization of iron and copper in Malabsorption syndrome. J Dairy Sci. 2002; 85:657-664.

4. Biliaderis CG, Khan MM, Blank G. Rheological and sensory properties of yoghurt from skim milk and ultra filtered retentates. Int Dairy J. 1992; 2:311-323.
5. Chawala AK, Balachandran R. Study on yoghurt from buffalo milk: Effect of different levels of fat on chemical, rheological and sensory characteristics. Indian J Dairy Sci. 1993; 46(5):220-222.
6. Cho-Ah-Ying F, Duitschaver CL, Buteau C. Influence of temperature of incubation on the physico- chemical and sensory quality of yoghurt. Cult. Dairy Prod. J. 1990; 25(3):11.
7. Gaston A, Goncalvez D, Perez C, Reolon G, Segura N, Lema P, *et al.* Influence of gelatin and starch on the instrumental and sensory texture of stirred yoghurt. Int. J of Dairy Technol. 2007; 60(4):263-269.
8. Ghadge PN, Prasad K, Kadam PS. Effect of fortification on the physico-chemical and sensory properties of buffalo milk yoghurt. Electronic J Environ. Agric. Food Chem. 2008; 7(5):2890-2899.
9. Jenness R. Composition and characteristics of goat milk: Review 1968-1979. J Dairy Sci. 1980; 63:1605-1630.
10. Kondyli E, Katsiari MC. Fatty acid composition of raw Caprine milk of a native Greek breed during lactation. International Journal of Dairy Technology. 2002; 55(1):57-60.
11. Martin-Diana AB, Janer C, Pelaez C, Requena T. Development of a fermented goat's milk containing probiotic bacteria. International Dairy Journal. 2003; 13(10):827-833.
12. Patel RS, Schauen AR. Lactic Acid Bacteria, Yoghurt and Health Benefits. Indian Dairyman. 1997; 49(9):9-14.