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Quality Assessment of Different Milk Brands Available in Kottayam District, Kerala

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Abstract Milk is a perishable commodity; its low acidity and high nutrient content make it the perfect breeding ground for bacteria. Milk quality control tests are designed to ensure that milk products meet accepted standards for chemical composition and purity as well as levels of different micro-organisms. To assess the quality of the different milk brands available in Kottayam district, Kerala. Using questionnaire, information was elicited among the local people, to know the highly preferred milk sample; three more samples of varied brands were selected for the present study. Microbial, organoleptic and chemical parameters tests were carried out in all the 4 samples. Government owned milk brand had the overall quality with its highest ranking of preference and absence of coliform, < 2000cfu, 0.14 level of acidity, fat content and SNF being 3.5 and 8.5 respectively. By and large, certified farms/dairy must meet provincial standards for quality milk production, adequate processing and clean premises.
Keywords *Acidity; Coliform; Microbial; Organoleptic; Solid Not Fat*

1. Introduction

Milk is a complete food which invariably improves the food and nutrition security of the country. Of the total world population, 6 billion consumes milk and milk products. More than 750 million people live within dairy farming households (Haytowitz, 2006). There are numerous dependent factors which includes geographic and climatic conditions, availability and cost of milk, food taboos, and religious restrictions (Deborah, 2007).

Milk is highly perishable and spoils very easily, if not properly processed. It's the low acid and high nutrient content which are favorable for the growth of the microbial activity (McGee, 2004). Especially the high nutrient load causes the rapid multiplication of bacteria in an unhygienic condition stored at ambient temperature (Wiley, 2008). Milk has to be thoroughly processed inorder to make the consumers safe from milk borne diseases.

Good-quality raw milk is required to make good-quality dairy products. The degree to which milk consumption and processing occurs will differ from region to region. Therefore, it is important that raw milk of varied quality be produced and handled from farm to plant under suitable conditions. So the present study was planned to assess the quality of most commonly consumed milk brands in Kottayam District.

2. Materials and Methods

The present study was conducted at Nattakom Panchayath in the Kottayam district of Kerala. Among the 500 house in the Panchayath every 11th house were selected for the study survey. Questionnaires were issued to the home makers to elicit the information on the preference of milk they use. As per their response, the consumer preference of various milk brands was determined.

Highly preferred four milk samples coded AA1, AA2, AA3 and AA4 were selected for the present study on the basis of the result of the questionnaire conducted in the Panchayath. Among the milk samples three of them were branded sachet milk and the remaining one was the milk from the households. Commercially available milk sachets and the fresh natural milk were purchased from local markets in Nattakom Panchayath Kottayam, Kerala. The fresh animal milk samples were collected in thoroughly washed and cleaned steel containers. The other milk samples were collected in the same form as marketed. All milk samples were brought to the laboratory for conducting various physicochemical and microbial analyses**.**

2.1. Assessment of Consumer Preference for Different Milk Brands Available in Kottayam District

Consumer Preference using the questionnaire was conducted at house hold level for different milk brands available in Kottayam District.

2.2. Assessment of Initial Quality of Selected Samples

Wholesome quality of a food is an essential requirement of food processing, as any form of contamination during the manufacturing process are highly susceptible to consumers. It is obvious that the consumers are aware and totally rely on the manufacturing and processing standards

Quality Assurance (QA) is applied to verify the products in pre-production phase to overcome the defects and to meet the specifications and requirements of the finished products with overall quality (Jeffy, 2010)

2.2.1. Microbial Quality

The microbial quality of the selected samples were analysed to check the bacterial activity. Methylene Blue Reduction Test (MBRT), Standard Plate Count (SPC), Coliform Count and the Yeast and Mold Count were carried out.

2.2.2 Chemical Quality

Using a standard procedure, the acidity of the selected milk samples was determined by using the titratable acidity, the fat content by using the Electronic Milk Tester and the Gerber method, the Solid Not Fat (SNF) by standard equation (Babulal, 2003 and Cyriac, 2008) and Clot On boiling test was carried out to determine the acceptability of milk.

2.2.3 Organoleptic Quality

Organoleptic Assessment was done for the selected samples on the basis of Appearance, Taste, Odour and the Texture to check out whether the samples are of good quality condition.

3. Results and Discussion

Consumer preferences of various milk brands were determined and presented in the Table 1, it is understood that AA2 sample have an increasing rate of preference of 50% and secondly, sample AA3 have 30%. So it is clear that the AA2 sample which is of government owned milk producer, have highest preference of percentage amongst the subjects.

Table 1: *Consumer Preference for Different Milk Brands Available in Kottayam District*

Milk Samples	% of Preference
AA1	10
AA2	50
AA3	30
AA4	10

Sample AA1- unprocessed milk, AA2-Milma, AA3 -Malanadu Milk, AA4- Sakthi Milk

Milk is extremely susceptible to spoilage by microorganisms and the microbiologist plays a major role in the dairy industry in quality control of milk. Good production and herd management practices help ensure low bacteria counts and reduce the risk of the presence of pathogens in the raw milk (Stradley, 2003). The details regarding the Microbial Quality Assessment of selected samples for Standard Plate Count are given in the Table 2. The MBRT time taken for the samples AA2 is 6 hrs, AA1 and AA4 took 4 hrs and AA3 nearly 3 hrs. It is obvious from the table, the samples AA2 and AA4 are in good quality compared to the samples AA2 and AA3 which are of low quality; it can also be noted from the table, that the standard plate count of sample AA1 and AA4 are less than 2500cfu and 2300cfu respectively. Sample AA2 and AA3 have a similar coliform count less than 2000cfu. Sample AA1 have high count of colonies because it is an unprocessed one. Colony count of the other samples had less than that of normal count. The normal limit of SPC in milk is < 2500. While the legal limit for total bacteria in farm raw milk is 100,000/ml, milk with counts of 10,000 or less is considered desirable and achievable by most farms (Reay, 2007). It is clear from the table, that Coliform Count or Coliform Bacteria in the selected milk samples are not present except for the sample AA1. Bacteria produce enzymes that degrade proteins, fats, and other components, resulting in reduced product quality when counts are high (Tannahill, 2009). This indicates the proper maintenance of quality parameters during processing of milk samples. E. coli is an important food-borne disease organism and enteropathogenic type which can cause diarrhea; even cause complications resulting in fatalities (Merrill, 2009). Coliform bacteria include the organisms Escherichia coli (E. coli) and Enterobacter aerogenes, both of which are normal inhabitants of the large. The presence of these organisms in milk therefore indicates fecal contamination by unsanitary handling after the completion of the pasteurization process (Stephanie, 2012). The presence of coliform in the milk sample AA1 is due to the lack of processing, the improper handling of the milk and must have been contaminated through water or any other means. So it requires adequate heating for its total destruction. None of the samples are contaminated with the Yeast and Mold, which signifies the proper quality treatments of the milk samples during the processing.

***Table 2**: MBRT Time, Standard Plate, Coli Form Count, Yeast/Mold of Selected Samples*

Milk Samples	MBRT Time	Standard Plate Count	Coliform Count	Yeast and Mold
AA1	<4	**< 2500 CFU**	**< 10 CFU**	**Nil**
AA2	>6	**<2000 CFU**	**Nil**	**Nil**
AA3	>5	**<2000 CFU**	**Nil**	**Nil**
AA4	<6	**<2300 CFU**	**Nil**	**Nil**

Sample AA1- unprocessed milk, AA2- brand 1, AA3– brand 2, AA4- brand 3

Acidity measures the lactic acid in the milk. Bacteria that normally develop in raw milk produce more or less of lactic acid. Acid forming bacteria will cause a sour taste in milk and will lead to a pH drop in milk from 6.6 to a pH of 4.6. In the acidity test the acid is neutralised with 0.1 N Sodium hydroxide and the amount of alkaline is measured (NDC, 2010). Table 3 presents the details regarding Acidity level, fat and solid not fat (SNF) content. The 0.15 was the Acidity level in the samples AA1 and AA4; 0.14 in the samples AA2 and AA3 respectively. This proves that all the samples are in the normal range of acidity level. If the acidity is higher than 0.19%, it need not to be processed. If the lactic acid content is lower than the normal range (0.10%), then it may be of two reasons; 1. Either the milk is of poor quality and 2. Sodium hydroxide/bicarbonate might have been added (Pak Milk Info, 2012) due to lactic acid, formed as a result of growth of Lactic Acid Bacteria in milk. Action of them on lactose is responsible for lactic acid production in milk. Produced Lactic acid contributes a major part of the milk acidity and it can be measured by simple titration method. It is expressed as per cent Lactic acid (BC Diary, 2010).

***Table 3:** Acidity, Fat and Solid Not Fat Content of Selected Samples*

Milk Samples	Acidity	Fat Content	Solid Not Fat
AA 1	0.15	3.01	8.2
AA 2	0.14	3.5	8.50
AA 3	0.14	3.8	8.55
AA 4	0.15	3.02	8.05

Sample AA1- unprocessed milk, AA2- Milma, AA3- Malanadu Milk, AA4- Sakthi Milk

Organoleptic assessment should always be the first screening of the milk, since it is cheap, quick and does not require any equipment. These tests are also called 'organoleptic tests' (Mother Diary, 2010).

The organoleptic evaluation of quality parameters and standards set for milk is outmost importance because there are no laboratory methods which can replace human senses in judging the parameters like appearance, colour, aromas, taste, quality of a package etc., (BC Diary, 2010). The organoleptic testing of raw milk and milk products uses normal senses of sight, smell and taste in order to observe and record the overall quality. The result of this test (Table 4) is obtained immediately on the spot where and when it is carried out. This method is of minimum cost but when correctly used it is very useful and, e.g. permits rapid screening out of poorest quality milk at reception. It is applicable on farms, during milk collection, at milk reception and at the milk processing plant (NDC, 2010).

From the result of organoleptic assessment of the sample it is seen that the quality parameters of the sample AA1, AA2 and AA3 are in the category of good and the sample AA4 in satisfactory because its appearance was cloggy, taste was not appealing, texture was granular and the odour was also not as like of fresh milk.

Table 4: *Organoleptic Assessment Test of Selected Samples*

Parameters	AA1	AA2	AA3	AA4
Appearance	Good	Good	Good	Satisfactory
Taste				
Texture				
Odour				

Sample AA1- unprocessed milk, AA2- Milma, AA3- Malanadu Milk, AA4- Sakthi Milk

Perusal of Table 5 indicates the details regarding the Chemical Quality Assessment of selected samples for Corrected Lactometer Reading. Corrected Lactometer Reading of the sample AA1 is 27, sample AA2 and AA3 are 28, and for sample 4 is 29.5. This result shows the adulteration of milk with water, among these milk samples, sample AA4 is extremely adulterated with water. In continuation with the Chemical Quality Assessment for Fat Content, it is obvious from the table, that the sample AA3 has an appreciable content of the fat i.e., 3.8, sample AA2 is 3.5 followed by the samples AA4 and AA1 is 3.02 and 3.01 respectively. Invariably milk contains approximately 3.4% total fat. Some of the fatty acids are found in very small amounts but contribute to the unique and desirable flavour of milk fat and butter (NDC, 2010). From the table it is also depicted that Solid Non Fat content of sample AA1 is comparatively low (8.2) than the sample AA2 which is 8.5 and sample AA3 with 8.55 of SNF indicates mineral content in them. Corrected Lactometer Reading of the sample AA1 is 27, 28 for the sample AA2 and AA3, and for sample 4, it is 29.5; shows the adulteration of milk with water, among these, sample AA4 is extremely adulterated with water. The specific gravity of milk does not give a conclusive indication of its composition since milk contains a variety of substances that are either heavier or lighter than water (Mother Dairy, 2010).

Table 5: *Corrected Lactometer Reading of the Selected Samples*

Milk Samples	Corrected Lactometer Reading
AA1	27
AA2	28
AA3	28
AA4	29.5

Sample AA1- unprocessed milk, AA2- Milma, AA3- Malanadu Milk, AA4- Sakthi Milk

4. Conclusion

The tests for Quality assurance ensured that milk products meet the accepted standards and regulations in chemical composition, microbial load and overall quality. The selected four milk samples (two from private branded and the government owned) were assessed for the initial quality. The quality was assessed in terms of microbial, organoleptic, chemical parameters and adulterant tests. From our findings, the sample AA2 which was of Government owned milk brand was extensively considered to be the best quality milk as its purity, adequate processing and consumer preference were markedly significant.

References

Babulal. *Food Outlook - Milk and Milk Products, FAO, United Nations.* 2003.

Cyriac, *Food Outlook - Global Market Analysis.* Food and Agriculture Organization of the United Nations. 2008. 8; 51-54.

Debora. *Effect of Heating and Cooling on the Milk Salts and their Interaction with Casein, Heat Induced Changes in Milk.* International Dairy Federation, Brussels, Belgium. 2nd Ed. 2007.

Haytowitz*. Physical and Chemical Properties of Lactose.* Advanced Dairy. 2006. 3.

Jeffy, Andrea. *Re-imagining Milk: Cultural and Biological Perspectives.* 2010.

McGee. *Heat-Induced Changes In Lactose: Isomerization, Degradation, Maillard Browning, Heat Induced Changes in Milk.* 2004.

Reay, D. and Helmer, J.D. *Was Milk a "Secondary Product" in the Old World Neolithisation Process? Its Role in the Domestication of Cattle, Sheep and Goats.* Anthropozoologica. 2007. 42 (2) 9-40.

Stampfer. *Milk Fat in Human Nutrition.* Dairy Technol. 2006. 3-59.

Uruakpa and Anderson, I. *Vitamins in Milk and Milk Products.* Advanced Dairy Chemistry, Chapman & Hall, London. 2003. (3).

Wiley, J. *Reaction Chemistry of Lactose: Non-Enzymatic Degradation Pathways and Their Significance in Dairy Products.* Advanced Dairy Chemistry, Chapman & Hall, London, 2008. (3).

Stephanie, Peters J. *The Dromedary: Ancestry, History of Domestication and Medical Treatment in Early Historic Times.* Tierarztliche Praxis, Ausgabe G, Grosstiere/Nutztiere. 2012. 25 (6) 559-565.

Tannahill. *Europe's First Farmers: An Introduction*, *Europe's First Farmers*. Cambridge, Cambridge University Press. 2009. 1-18.