

**ANALYSIS OF MILK QUALITY & ADULTERATION IN MILK
SAMPLES COLLECTED FROM THANE****V. T. BENDALE*¹, C. L. PATIL², R. P. CHAVAN³ AND D. N. SHINDE²**¹ *Department of chemistry, A. Vartak College, Vasai, 401202*² *Department of chemistry, B.N.N. College, Bhiwandi, 421305*³ *Department of chemistry, Dnyanasadhana College, Thane, 400604***ABSTRACT**

Present study was conducted to analyze the milk quality and adulteration in milk sold in Thane City during the year 2015. Eleven branded pouch cow milk samples were collected from different sale points of Thane City. The samples were analyzed for fat, solid-non-fat (SNF), protein, acidity, neutralizers and adulterants. Our analysis showed that the milk samples analyzed were free from adulterants like Urea, Starch, Glucose, Sugar, Salt and Nitrates. Acidity ranged from 0.045 to 0.164, fat from 1.4 to 3.9%, Protein from 1.19 to 2.99%, SNF from 6.13 to 8.88%. The statistical analysis showed that the fat, protein, SNF of these samples showed significant differences.

KEYWORDS: Raw Milk, Composition, Adulterants, Comparison.***Corresponding author****V. T. BENDALE**

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INTRODUCTION

Milk contains all the essential nutrients for all physiological function of the human body system. The average composition of milk is 87.20% water and 12.80% dry matter (fat, proteins, lactose, ash). Milk is a good source of calcium, phosphorus and fat-soluble vitamins (A, D, E & K). For this reason, it is the nature's most nearly perfect food¹. Milk fat often called butter fat is commercially the most valuable constituent of milk. The protein of milk is not a single compound but include two major proteins, casein 80%, and lactoalbumin 18%, A third protein in milk is lactoglobulin 0.05 to 0.07%. Ash constituent of milk are extremely important in their relation to the heat stability of the milk². Adulteration of milk is one the most serious issue, which not only causes major economic losses for the processing industry, but also a major health risk for the consumers. Milk dealers may either dilute the milk or extract valuable component and there after add cheap substances to maintain its compositional parameters. These substances include urea, starch, flour, cane sugar, vegetable oil etc. Milk is a perishable commodity. Therefore, preservatives like penicillin, streptopenicilin, formaldehyde, hydrogen peroxide, sodium bicarbonate are added to milk³. The present study was conducted to achieve the following objectives.

- i) To determine the chemical composition of the milk available in the local market.
- ii) To detect various adulterants in market milk.
- iii) To check the hygienic status of market milk.

METHODS AND MATERIALS

Different eleven fresh milk samples of branded pouch cow milk were collected for analysis from Thane City, during the year 2015. The samples were immediately brought to the laboratory for analysis. Each sample was tested for physical examination, chemical composition, physico-chemical properties, hygienic status and detection of adulterants. The following analysis was carried out

Physical Examination

Each sample was observed for weight and flavor.

Chemical Composition

Different chemical parameters of milk such as fat, protein, SNF were determined by using standard procedure according to Fssai Manual 2015. Milk fat was determined by Gerber method. Protein was determined by Kheldahl method. Solid non-fat (SNF) content of milk was determined using formula.

SNF Content (%) = Total Solid (TS) Present – Fat Present.

TS was determined by Gravimetric Method.

Physico-Chemical Properties

Acidity in terms of percentage lactic acid was determined by standard procedure given in Fssai Manual 2015. Neutralizers are added to milk to neutralize the developed acidity of milk. Presence of neutralizer was determined using standard procedure.

Hygienic Status

Hygienic status of milk was determined by Methylene Blue Reduction Test (MBRT) and COB (Clot on Boiling) Test⁵.

Adulterants

Various adulterants like starch, urea, glucose, sugar, salt, nitrates were detected by using standard procedures⁵.

Statistical Analysis

Data collected on different parameters was analyzed statistically. The standard deviation was calculated to control the precision of examination and provided the possibility of compared the contamination of fresh pouch milk. The mean, minimum and maximum values were also calculated.

RESULTS AND DISCUSSION

Physical Examination

Weight

It was observed that all the samples analyzed has shown excess milk quantity in the range of 1.68 to 5.16%. The excess weight of samples S₁ to S₁₁ were 3.84, 5.16, 4.32, 2.44, 1.68, 2.76, 5.08, 4.32, 4.3, 3.34, 4.52% respectively. (Figure 1)

Flavor

The pleasant samples were contributed to 18%, not good contributed to 27% and good contributed to 54% in flavor category.

Chemical Composition

Fat: Result showed that maximum fat observed in sample S₂ (3.9%) followed by S₉ & S₁₁ (3.8%) while minimum was observed in sample S₅ (1.4%) followed by S₃ (2.2%). The values of fat content in samples S₁ to S₁₁ were 2.5, 3.9, 2.2, 3.7, 1.4, 3.7, 3.5, 3.1, 3.8, 3.4, and 3.8% respectively. The difference in fat content may be due to the difference in feeding pattern, breed of animal & season². The result showed that the samples below 3.5% fat has not maintained the standard Fssai Specification (Figure 2)⁵

Protein

Result showed that maximum protein content was observed in sample S₄ (2.99%) followed by S₂ (2.98%). The minimum protein content was observed in sample S₅ (1.19%) followed by S₁ (1.7%). The values of protein in samples S₁ to S₁₁ were 1.7, 2.98, 2.12, 2.99, 1.19, 2.55, 2.89, 2.38, 2.55, 2.8, and 2.8% respectively. All samples has shown below standard protein level of 3%(Figure 3).

SNF

Maximum SNF was recorded in sample S₄ (8.88%) followed by S₉ (8.78%). The minimum was observed in S₁ (6.13%) followed by S₅ (7.15%). The SNF content of sample S₁ to S₁₁ were 6.13, 8.68, 8.56, 8.88, 7.15, 8.64, 8.22, 8.63, 8.78, 8.7, and 8.53% respectively. The result showed that the amount of SNF recorded for 80% sample is similar to Fssai Standards (Figure 4).

Physico Chemical Properties

Acidity: Minimum acidity observed in sample S₁ (0.045%) followed by S₅ (0.054%). The maximum was observed in S₃ (0.164%) followed by S₁₁ and S₄ (0.135%). The acidity of samples S₁ to S₁₁ was 0.045, 0.126, 0.164, 0.135, 0.054, 0.126, 0.099, 0.101, 0.108, 0.117, and 0.135%. The acidity was found to be in the range of 0.045 to 0.164% (Figure 5).

Neutralizers

The test for neutralizers done for the samples found that out of 11 samples four samples has shown positivity for neutralizers.

Hygienic Status

COB (Clot on Boiling)

The result of COB test showed that except sample S₃ all sample has shown negative result. Therefore, almost all the samples were of good quality.

MBRT (Methylene Blue Reduction Test)

Two samples S₃ and S₉ (18%) were found to be of very poor quality, four samples S₁, S₅, S₈, S₁₀ (36%) of poor quality and five samples S₂, S₄, S₆, S₇, S₁₁ (46%) found to be of fair quality (Figure 6) ⁶.

Adulterants

Milk samples were tested for adulterants like Urea, Starch, Glucose, Sugar, Salt & Nitrates. No Sample was found to be adulterated.

Compositional properties of milk analysis results were presented in the Table 1. In our samples, Fat (3.20% ± 0.81%), Protein (2.45% ± 0.57%), SNF (8.26% ± 0.85), Acidity (0.11% ± 0.04%) were found. All the values were found satisfactory.

Table 1

Nutrient	Samples (n = 11) Mean + SD	Max. Value	Min. Value
Fat	3.20% ± 0.81%	3.90%	1.40%
Protein	2.45% ± 0.57%	2.99%	1.19%
SNF	8.26% ± 0.85%	8.88%	6.13%
Acidity	0.11%±0.035%	0.164%	0.045%

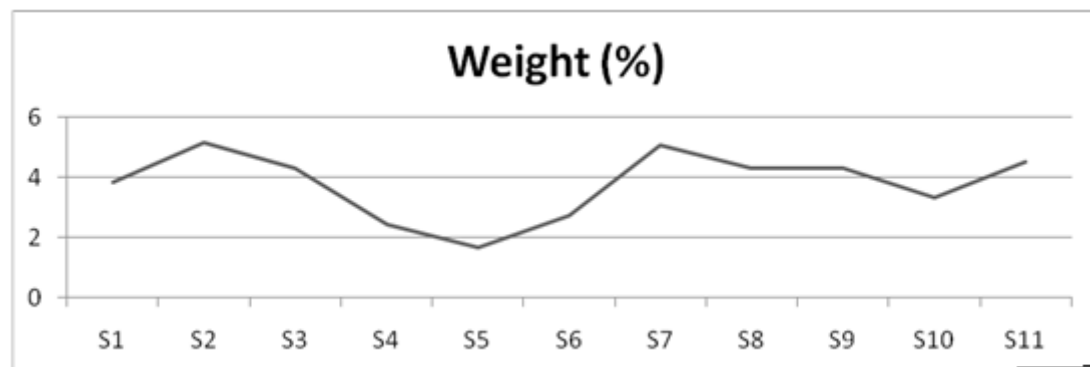


Figure 1
Excess weight of milk samples

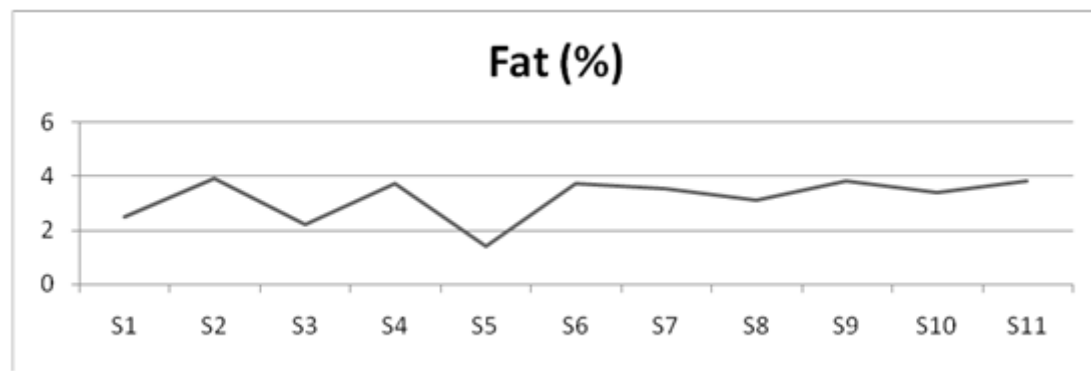


Figure 2
Fat content of milk samples

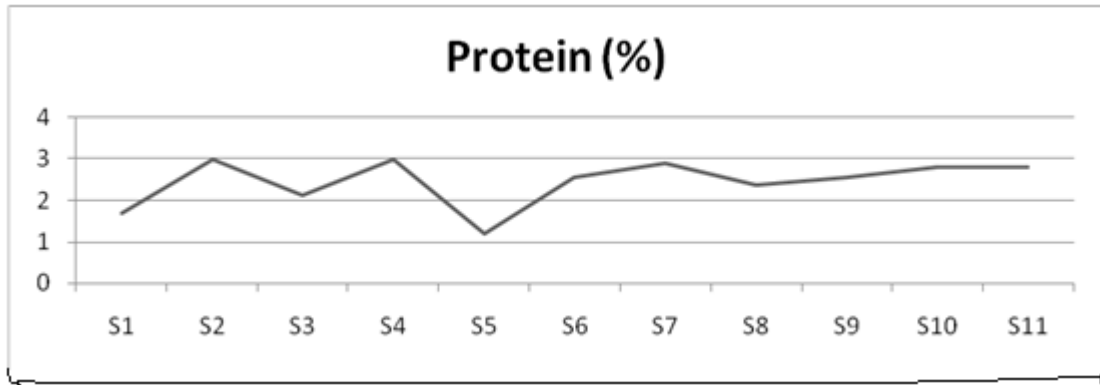


Figure 3
Protein content of milk samples

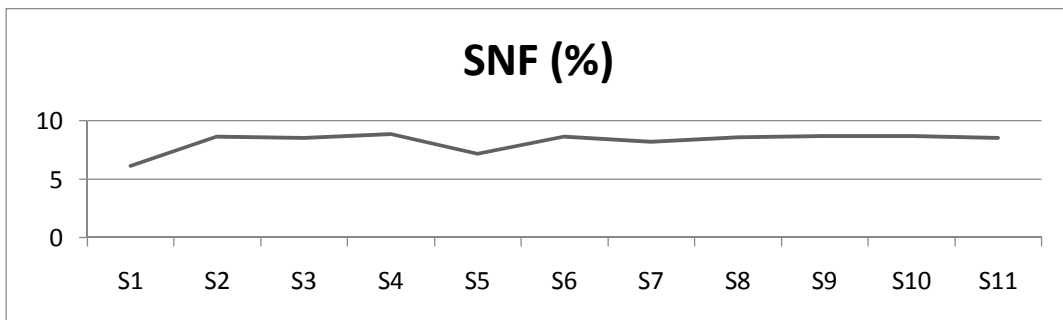


Figure 4
SNF content of milk samples.

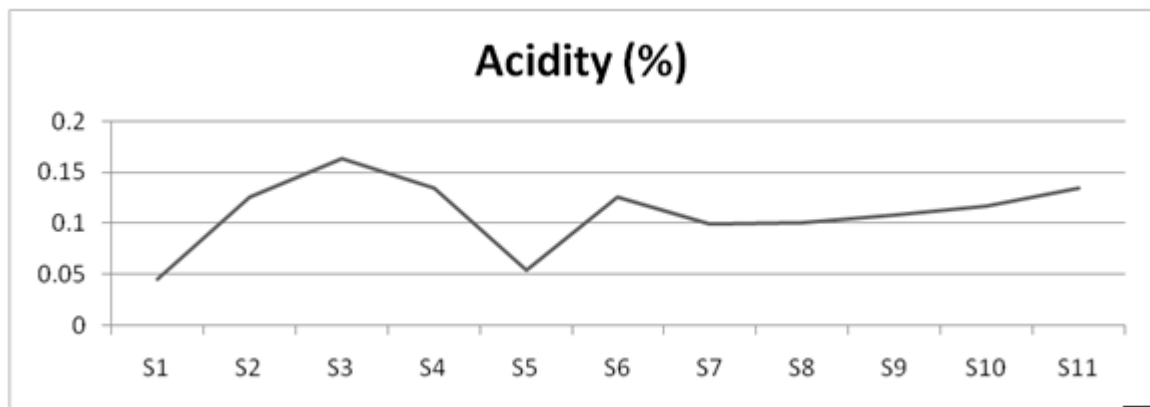


Figure 5
Acidity(%) of milk samples

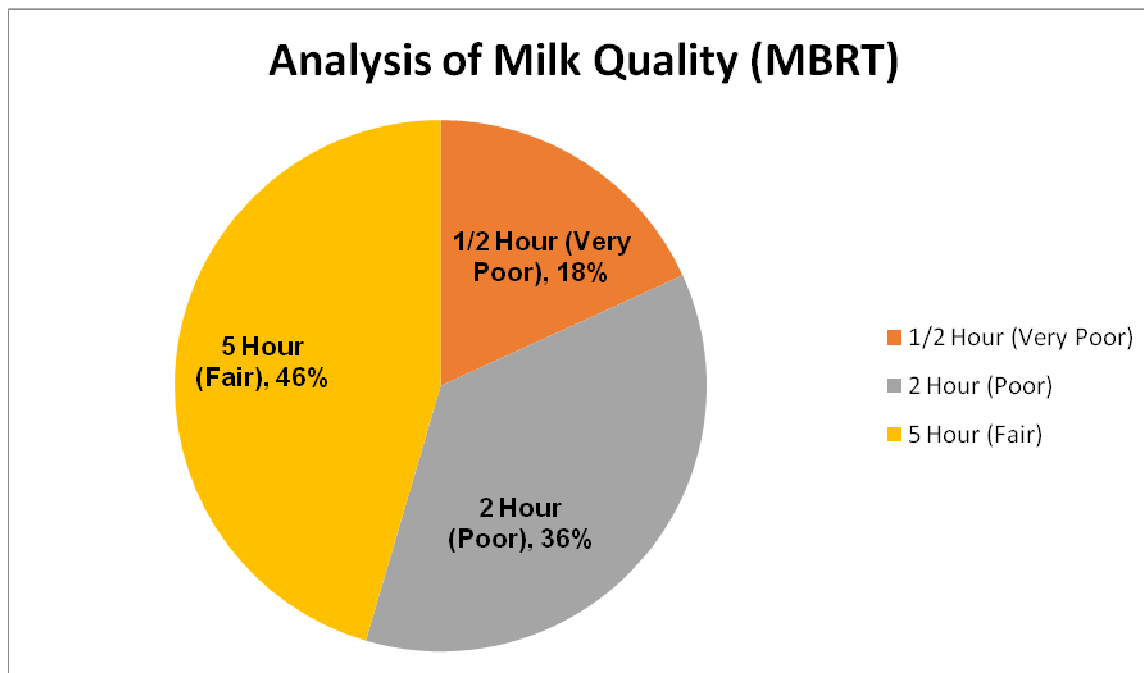


Figure 6
Analysis of milk quality (MBRT)

CONCLUSION

The result of physical examination, chemical composition, physio-chemical properties, hygienic status and adulteration showed that, milk available in Thane City of various brands in a pouch milk category almost meets Fssai Standards for fat, SNF, protein and found good for consumption purpose as no adulterants were found in analyzed sample.

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