

## COMPARATIVE STUDY ON PHYSIOCHEMICAL QUALITY OF RAW MILK SAMPLES COLLECTED FROM DIFFERENT VILLAGES OF KARUR DISTRICT, TAMILNADU, INDIA

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### ABSTRACT

The aim of this study was to determine the physio-chemical properties of raw milk sample, which included fat, protein, lactose, ash, titratable acidity, specific gravity, SNF (solid-not-fat), pH and MBRT (Methylene Blue Reduction Test). The sample were collected from five different villages (Mayanur, Puliampatti, Velliyanai, Vaiyampatti, Jagadabi), of Karur district. The organoleptic quality was investigated by a panel of experts with the help of appearance, texture, smell and taste characteristics as per standard score card. The analysis has been showed that, velliyanai and mayanur had good quality composition of raw milk, while other villages had normal quality composition of raw milk. The present study recommended that quality assurance programs should be help to start before processing of milk and milk products in dairy industries.

**Keywords:** Raw milk, Physiochemical analysis, chemical composition, MBRT.

### INTRODUCTION

Milk is an essential part of daily diet for the growing children and expectant mothers. Milk, is a major constituent of the diet, its quality assurance is considered essential to the welfare of a community. Milk is a compulsory part of daily diet for the expectant mothers as well as growing children<sup>1</sup>. Dairying provides one of the most cost effective methods of converting crude animal feed resources into high quality protein rich food for human consumption<sup>2, 3, 4</sup>. Consequently, the compositional and organoleptic properties of tropical milk products may differ from similar products manufactured in cooler climates<sup>5</sup>. Dairy product quality starts at the farm as good dairy products can only be made from good quality raw milk. So milk should have normal composition, not adulterated and produced under hygienic conditions<sup>6</sup>. Although the physico-chemical characteristic of milk from various species bearing constitutionally the some ingredients differ widely

in respect of their percentage due to several factors include breed, species feed, source of collection of milk, milking interval, seasonal influence and physiological status. The present study was undertaken with the aim of investigating the physiochemical properties of raw milk from different villages of Karur district.

### MATERIALS AND METHODS

#### Sample collection

The study was conducted at chemical laboratory under the department of quality control, Aasaii food products, Karur district. The milk sample were collected from five different villages (Mayanur, Puliampatti, Velliyanai, Vaiyampatti, Jagadabi), of Karur district. Twenty five individual samples of the raw milk were randomly collected from milking cow of each village. Samples were collected in 250 ml capacity sterilized screw cap bottles and transport to the laboratory for conducting the various physico-chemical tests.

### Physical examination of the samples

Organoleptic test of milk was performed visually, nasally and lingually with the help of a panel of expert to determine colour, flavor and texture.

### Taste panel scores

The organoleptic quality of each raw milk was evaluated by a panel of experts with the help of appearance, texture, smell and taste characteristics as per standard score card<sup>7</sup>.

### Physio-chemical Analysis of Milk Samples

The milk constituents (fat, protein, solid not fat), of the milk samples were determined by EKOMILK-ultra PRO milk analyzer (Milk analyzer: MILKANA KAM98-2A, Everest instruments, INDIA), according to manufacturer's instructions. Milk samples were mixed gently 4-5 times to avoid any air enclosure in the milk. Then 25 ml samples were taken in the sample-tube and put in the sample- holder one at a time with the analyzer in the recess position. Then when the starting button activated, the analyzer sucks the milk, makes the measurements, and returns the milk in the sample-tube and the digital indicator (IED display) shows the specified results. The acidity of the samples was determined according to<sup>8</sup>. The pH of the samples was determined using pH-meter (Digital pH Meter-111/101, Deep vision instruments, India). Specific gravity was also determined using lactometer.

### Determination of total ash

The total ash was determined gravimetrically by igniting the dried milk samples in a muffle furnace in which the temperature was slowly raised to 550°C. The sample was ignited until carbon (black color) disappears or until the ash residue becomes white<sup>9</sup>.

$$\text{Percent of ash} = \left( \frac{\text{Weight of residue}}{\text{Weight of sample}} \right) * 100$$

### Methylene Blue Reduction Test

1ml of methylene blue (1:2500) is added to 10 ml of milk. The tube was sealed with rubber stopper and slowly inverted 3 times to mix. Tubes were place in water bath at 35°C and examine at interval up to 6 hour. Then check the time to change for methylene blue to become colourless is the methylene blue reduction time (MBRT). The shorter the MBRT lower the quality of milk. The grading of milk sample on the basis of methylene blue reduction test in different milk samples are raw milk sample.

### RESULT AND DISCUSSION

A Range of physical parameters were studied after collecting the sampling of milk from different villages in Karur. Out of 125 samples analyzed, 60 samples were found yellowish white, 45 samples were white, 10 samples were light yellowish white and 10 samples were deep yellowish white in colour. The results were depicted (Table 1). These findings agreed with the reports of<sup>10</sup> who reported that normal milk has a yellowish white color due to the presence of fat, casein and the presence of small amount of colouring matter. These differences in colour may be due to the differences in nature of feed consumption or the breed of cow or the fat and solid contents of the milk<sup>11</sup>.

Among 125 milk samples 110 had normal flavour, 15 had sweet aroma flavour (Table 1). In this respect<sup>12</sup> reported that a cowy flavor was found in milk from cows with Ketosis. The texture of raw milk sample was examined before starting the experiment. The result indicates the milk samples collected from different villages of Karur district had normal texture. Fourteen milk samples of Jagadabi had thin texture. Thin texture in milk sample of Jagadabi might be due to breed quality of the milking cows or percentage of water in milk. The data on physio-chemical quantitative analysis for the raw milk are presented in Table-2. The highest fat content i.e., 4.43 ± 0.50% was registered in the village of Velliyanai; Jagadabi registered the lowest content of fat (4.05 ± 0.01). With regard to protein content, Velliyanai village were found to have higher levels (3.42 ± 0.14%), while the lowest protein content of 3.24 ± 0.01% was recorded in Puliampatti. The highest solid non fat content (8.53 ± 0.02%) was exhibited by Velliyanai; whereas the lowest concentration (8.27 ± 0.01%) was observed in Vaiyampatti. The highest content of ash was exhibited (0.754 ± 0.01) by Velliyanai and while the lowest content (0.723 ± 0.10) was recorded in Jagadabi. The specific gravity of the investigated raw milk appear to be in the range of 1.027 ± 0.20 for Mayanur, 1.026 ± 0.50 for Puliampatti, 1.027 ± 0.12 for Velliyanai, 1.029 ± 0.21 for Vaiyampatti and 1.024 ± 0.30 for Jagadabi. The highest titrable acidity of milk content (0.158 ± 0.10) was recorded in Vaiyampatti and while the lowest titrable acidity (0.144 ± 0.14) was obtained in Mayanur.

The MBRT results of raw milk samples are tabulated in Table-3. In raw milk samples, two villages of Mayanur and Velliyanai samples were

good, while other three villages of Puliyampatti, Vaiyampatti and Jagadabi samples were poor.

### CONCLUSION

In the present study, preliminary investigations were carried out to ascertain the physiochemical characteristics of raw milk samples collected from different villages of Karur district. Based on above mentioned, it can be concluded that daily receiving control of the raw milk entering in factory from each farmer was strongly positive

correlation. In this way, farmers can have a clear picture of raw milk standard and also higher level of hygienic delivered of raw milk. The physiochemical properties of the collected milk were within the recommended levels as per BDS and WHO Standards. In conclusion, the present study recommended that quality assurance programs should be help to start before processing of milk and milk products in villages of raw milk had poor result of MBRT.

**Table 1: Physical Parameter of raw milk sample collected from different villages of Karur**

Parameters	Mayanur	Puliyampatti	Velliyanai	Vaiyampatti	Jagadabi
Color	YW 50% DYW 50%	YW 42% W 58%	YW 62% W 38%	YW 46% W 54%	LYW 64% W 36%
Flavor	Normal 100%	Normal 100%	Normal 50% Sweet aroma 50%	Normal 100%	Normal 100%
Texture	Normal 100%	Normal 100%	Normal 100%	Normal 100%	Normal 86% Thin 14%

%-Percent; YW-Yellowish white; W-White; DYW-Deep yellowish white; LYW-Light yellowish white.

**Table 2: Physio-chemical parameter of raw milk sample collected from different villages of Karur**

Parameters	Mayanur	Puliyampatti	Velliyanai	Vaiyampatti	Jagadabi
Fat (%)	4.32 ± 0.04	4.21 ± 0.20	4.43 ± 0.50	4.27 ± 0.01	4.05 ± 0.01
Protein (%)	3.36 ± 0.03	3.24 ± 0.01	3.42 ± 0.14	3.31 ± 0.02	3.26 ± 0.34
Ash (%)	0.752 ± 0.11	0.734 ± 0.04	0.754 ± 0.01	0.737 ± 0.42	0.723 ± 0.10
Solid not fat (%)	8.42 ± 0.12	8.45 ± 0.02	8.53 ± 0.02	8.27 ± 0.01	8.28 ± 0.01
Titrateable acidity (%)	0.144 ± 0.14	0.153 ± 0.12	0.152 ± 0.23	0.158 ± 0.10	0.146 ± 0.21
Specific gravity	1.027 ± 0.20	1.026 ± 0.50	1.027 ± 0.12	1.029 ± 0.21	1.024 ± 0.30
pH	7.02 ± 0.12	6.93 ± 0.21	7.04 ± 0.11	6.95 ± 0.01	6.82 ± 0.13

\*All the values are ±SD.

**Table 3: Decolorization time and grading of milk sample collected from different village of Karur regions**

Name of village	Raw milk Decolorization time (hr)	Grade
Mayanur	4.30	Good
Puliyampatti	2.00	Poor
Velliyanai	3.35	Good
Vaiyampatti	1.30	Poor
Jagadabi	1.20	Poor

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