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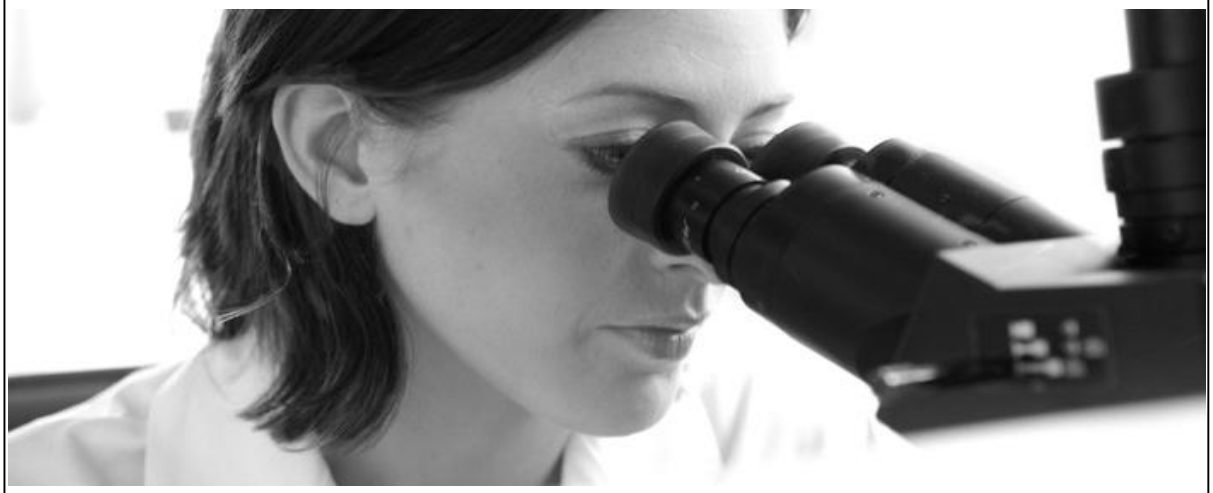

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RESEARCH ARTICLE

STUDY ON PHYSIOCHEMICAL CHARACTERISTICS OF RAW MILK SAMPLES COLLECTED FROM DAIRY PLANT OF ALIGARH

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ABSTRACT

The study was conducted to evaluate physiochemical quality of milk samples in selected dairy plant of Aligarh. Various physicochemical properties of milk were analyzed and compared to Bureau of Indian Standards (BIS). Total 10 different milk samples were analyzed. The results for raw milk samples showed pH 6.171% ±0.171%, titrablel acidity 0.81% ±0.08%, solid not fat 8.23% ±1.410%, total solid 12.827%±1.38%, fat 5.33% ±0.725%, protein 3.533% ±0.082%, ash 0.825% ±0.053% and Moisture content 86.074% ±3.42%. Statistical analysis of data revealed that there is significant difference ($p>0.05$) between results of collected samples and Bureau of Indian Standards. Therefore, it was concluded that the raw milk was very poor quality and adulterations were found during study.

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INTRODUCTION

Indian dairying is emerging at an important growth level of the Indian economy. It is the single largest contributor to Agriculture sector (17%) in India, contributing about 8% to Gross Domestic Product. Milk production in India has increased fivefold in the last fifty years and it continues to be No.1 in the world [1].Physiochemical analysis is important tool to monitor the quality of dairy products. Milk is an important source of all basic nutrients for mammals. Milk from various mammals are used for producing different dairy products including milk cream, butter, yogurt, ghee, sour milk, etc. [1,2]. Fresh milk considered as a complete diet because it contains the essential nutrients as lactose, fat, protein, mineral and vitamins in balanced ratio rather than the other foods [8]. Milk is an important source of all basic nutrients required for mammals including human beings [3].

It is ideal for microbial growth and the fresh milk easily deteriorates to become unsuitable for processing and human consumption [6]. The presence of foodborne pathogens in milk is due to direct contact with contaminated sources in the dairy farm environment and to excretion from the udder of an infected animal [10]. Although, it is very difficult to assure high quality and desirable physicochemical properties of raw milk designed for processing, the quality of raw milk encompasses such milk characteristics as chemical composition, physical properties, microbiological and cytological quality, sensory properties, technological suitability and nutritive value [5]. Therefore nutritionally enriched milk and its products with enhanced biological potential and without health risks are generally demanded [7].The present study was conducted to evaluate various physiochemical properties of milk including its pH, titrable acidity, solid not fat, total solid, fat, total protein, ash, moisture content were analyzed and compared to the valid Standards. Moreover determinations of physiochemical content in collected samples were a major concern of this study.

METHODS AND MATERIALS

Milk samples were procured from selected co-operative farmers at Samprash food industry, Aligarh during January to April 2015. Total 10 samples were analyzed in every day study. Analyses were performed at the milk collection centre according to AOAC 2000 methods to determine the composition of the milk using auto Lactoscaner (Dr Gerber, Germany), the quality and compositional properties.

Physical Analysis

The physical characteristics of various milk samples were

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determined shortly after they determinations were carried out according to AOAC 2000. The pH measurement was made using a digital pH meter. Titrable acidity was measured by titrimetric method. Color yellowish white, flavor normal and texture normal was measured by sensory analysis.

Chemical Analysis

Different chemical properties of milk such as ash, protein and moisture content were estimated by the Lacto scanner (Dr Gerber, Germany), AOAC 2000. Determination of the total fat content of sample was done by Gurber Method. SNF and TS were calculated by the following equations %SNF = (LR/4) + (0.22XFat) +0.72 %Total Solids = SNF % + Fat %

Statistical Analysis

The standard deviations were also calculated to control the precision of examination and provide the possibility of comparing the contamination of fresh raw milk. The exel was used for statistical analyses. Descriptive statistics including mean, standard deviation, minimum and maximum values were obtained. The significant differences between means were calculated (ANOVA) using multiple-regression range test at P>0.05.

RESULTS AND DISCUSSIONS

All the results from the analysis were compared to the standard values suggested by Indian Standard [4]. Compositional properties of milk analysis results were presented in the table 1 and fig. 1. In our sample, titrable acidity (0.81%±0.087%), total solid (12.827%±1.386%), fat (5.33%±0.725%), ash (0.825%± 0.0538%) and moisture content (86.074%±3.421%) percentages were higher than the standards.

Other chemical properties (protein, SNF, and pH) were found in similar standards of BIS. To keep the good quality for long time storage, acidity of milk should be less than 0.15% as BIS. Acidity percentage of collected milk were measured 0.81% ensure that the quality of milk was very poor.

Table 1 Physical parameter of raw milk sample collected from dairy plant of Aligarh

Parameters	Physical characteristics
Color	Yellowish white
Flavor	Normal
Texture	Normal

Table 2 Mean values (± SD)for physiochemical parameter of raw milk obtained from dairy cooperative milk collection center in Aligarh city (n=10)& compared with BIS

Parameters	Standards (BIS) %	Samples(n=10) Mean ± SD	Max. Value	Mini. Value
pH	6.7	6.171±0.643	6.66	4.66
TA%	0.15	0.81±0.087	0.9	0.7
SNF%	9	8.231±1.410	10.64	6.02
TS%	12.5	12.827±1.386	14.84	10.56
Fat %	5	5.33±0.725	6.9	4.5
Protein%	4.1	3.533± 0.0822	3.67	3.445
Ash%	0.58	0.825± 0.0538	0.9	0.698
Moisture%	84	86.074±3.421	90.12	80.25

The analysis using ANOVA revealed significant differences between variables of the samples and the standards for fat, protein, ash, acidity, TS and solid-not-fat (Table 3).

All the values were close to the earlier findings in good agreement with the BSI standard except acidity and ash content.

Table 3 Variance analysis of chemical parameters of milk

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
pH	10	61.71	6.171	0.414298889
TA%	10	8.1	0.81	0.007666667
SNF%	10	82.31	8.231	1.989321111
TS%	10	128.27	12.827	1.921601111
Fat %	10	53.3	5.33	0.526777778
Protein%	10	35.332	3.5332	0.006761067
Ash%	10	8.25	0.825	0.002896444
Moisture%	10	860.74	86.074	11.70931556

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	58054.83	7	8293.547134	4002.04013	1.36778E-90	2.139655512
Within Groups	149.20775	72	2.072329828			
Total	58204.038	79				

The variance analysis for individual quality traits of raw milk showed in Table 3. Results of the analysis of variance confirm that the variability of certain chemical parameters of milk was significant (p>1.37).

Table 4 Data of correlation strength among pH, Acidity, SNF, TS, Fat, protein, Ash and Moisture

	S.No	*pH*	*TA%*	*SNF%*	*TS%*	*Fat %*	*Protein%*	*Ash%*	*Moisture%*
S.No	1								
pH	-0.02708	1							
TA%	0.020956	-0.2269	1						
SNF%	-0.17602	0.12547	0.23923	1					
TS%	-0.38665	0.40356	-0.4648	0.2355	1				
Fat %	0.08343	0.10529	0.41437	0.5367	-0.303	1			
Protein%	-0.49854	-0.2546	-0.2843	0.26662	0.5031	0.2125	1		
Ash%	-0.6628	-0.1357	-0.0448	-0.2097	0.4261	-0.417	0.374942	1	
Moisture%	0.040539	0.2257	0.0692	-0.1801	-0.329	0.2983	-0.25889	-0.4	1

Where, TA- Titrable acidity, SNF- Solid Not Fat, TS- Total Solid.

Intensity of the correlation between analyzed parameters in milk sample was found significantly in Table 4. In this study, statistically highly significant correlation (P<0.001) between all observed parameters in milk were established. Positive correlation between the content of milk fat and SNF, total solid and protein, total solid and ash, total acidity and fat and negative correlation between the content of milk total acidity and total solid, fat and ash, ash and moisture showed in the Table 4.

CONCLUSIONS

Milk is ideal food for human health. Adulteration of milk reduces the quality of milk itself and the dairy products. In the present study, preliminary investigations were carried out to ascertain the physiochemical characteristics including adulteration parameters and nutritional quality of various unprocessed raw milk samples at selected milk collection centre. However, some commercial milk products contain comparatively higher concentrations of ash and titrable acidity. It suggests that the technology and quality control for milk

processing should be improved and environmental pollution should be controlled. It would be a great interest if further investigations are to be carried out to examine other organic and inorganic components of milk. The study will create awareness among consumers level in urban and rural areas of Aligarh.

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